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From The Desk of the Editor-in-chief...

A lot has changed since 2020 and one of the most significant impacts has been the rise of technological advancements in almost every field. Little did we know our lives would become digital and innovations in technology would take the front line.

In the “world of information”, information technology has become a part of our daily lives. It helps to deal with every day’s dynamic things. Technology offers various tools to boost development and to exchange information.

Digital transformation has accelerated at an unprecedented pace, workplaces and working practices have changed beyond recognition. None of this is ‘new’ as such, more that recent events have accelerated changes that were already underway, hitting fast forward on everything from the rise of remote working.

The pandemic has taught us important lessons about crisis, communication, and disinformation, as well as causing scientists to rethink how they examine public-health issues. The pandemic's worldwide scale has brought people from all over the world together like never. Researchers may test ideas and therapies more quickly than before because there is so much interest at the same time.

This journal is centered on the need for a platform where management scholars, researchers, academicians, and practitioners may exchange the ground-breaking results of their study across a variety of management domains and, as a result, contribute to theory development in the field of environment and ecosystem .

The wide range of papers presented touch nerves of varied subject bodies right from healthcare organizations to significance of macroeconomic variables. The aim is to cultivate a global ecosystem where discussions can be organized on the evolving demographic, socio-political, industrial, and digital patterns across business and society globally.

Enjoy Reading…

Sanjeev Bansal

Amity Journal of Energy & Environment Studies
2020, Volume 6, Number 2

The Role of Artificial Intelligence in Energy Efficiency

Aniket Chatterjee* **Tanushree Garg****

After years of evolution, development and improvements, Artificial Intelligence (AI) has now become an integral part of our life and has started to influence the fields of architecture and sustainability. The emerging concepts of smart grids and smart buildings which utilizes AI promise a new age of urban energy efficiency. By using AI technologies at the different scales, energy consumption can be reduced through better control, improved reliability, and automation. This article is a review of the evolution of artificial intelligence and the need for energy efficiency. It further discusses the role AI plays to improve the energy efficiency systems which saves the over exploitation of the fossil fuels and provides us a habitable environment with reduced pollution.

Keywords: Energy efficiency, artificial intelligence, smart grid, smart buildings, BIM, neural networks

INTRODUCTION

Everyone around the world uses energy for activities like heating, cooking, transportation, manufacturing, lighting, etc. The choices people make about how to use this energy affects the environment and people's lives. Anywhere the energy is consumed, there is an opportunity to improve its efficiency. There are opportunities at all levels of energy use, from household appliances to large scale industrial projects. This is where Artificial Intelligence steps in and plays an important role. Artificial intelligence uses vast data and its own predictive nature of complex programming to provide with ideas of saving the energy which is being used excessively and providing different echniques and opportunities to re-use the conserved energy in the appropriate time of need. As technology has progressed the focus is on providing a better environment where the shift of energy consumption is better optimized with the assistance of artificial intelligence.

What is Artificial Intelligence?

Artificial intelligence is the use of a person's intelligence and thoughts by machines. Artificial intelligence is a research field in which systems operate in response to the environment and understands the accessibility to achieve their goals depending on the situation. This is the intelligence which is associated with the capabilities of the system to adapt and improvise to new environments in order to generalize system knowledge and apply it to unknown situations.

Artificial Intelligence came into existence in 1956 but in today's time it is incorporated advanced algorithms and to improved computing power and storage. Artificial Intelligence is used today in every major industry and technology front to increase the work capacity and ease life of humans with detection of credit card frauds, flight management, stock market, devising marketing strategies and many more. Ancient philosophers and mathematicians played a major role in creating the plethora of a universe which is known as artificial intelligence. The study of logic led directly to Alan Turing`s work, 'Computing Machinery and Intelligence' which is based on the mathematical theory, in which he offers a test, now famously known as the "Turing Test", where a person would try to segregate between a computer and human text response. While this test has gone through with different taste of interest between many experts, it still remains an important influence for artificial intelligence as well as an being a logical part of philosophy as it utilizes around speech. The critical thinking of a person for the machine is that it should think and react like humans, but the ideal approach of the machine is to actually think rationally, and the systems should act rationally. At its simplest form, artificial intelligence is a study, which combines

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machine learning and complex data sets which help in solving problems pertaining to different situations. It also surrounds itself with subfields of machine learning and deep learning, which are playing a major role in the development of artificial intelligence. These disciplines are comprised of algorithms which tries to create adept systems that tries to make predictions or classify based data which is given to the system.

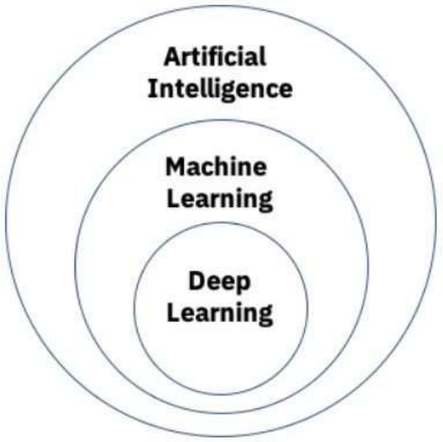

Figure 1: Layers of artificial intelligence

From the 1950s to the 1970s, artificial intelligence has been known to be a form of neural network. A neural network is a machine with interconnected nodes which allows it to behave like neurons inside the brain of any other human. With the help of algorithms, hidden patterns and correlations are identified by the machine in raw data, group and classify them, and continuously how it concluded and always tries to improve it with time. The original goal of the neural network approach was to create a computer system that could solve problems like the human brain thinks and reacts to however, as time has passed, researchers have moved their focus on using neural networks to perform certain specific tasks, leading to divergence from with rigorous biological approaches. Since then, neural networks have always supported a variety of tasks such as computer vision, speech recognition, machine translation, social network filtering, board and video games, and medical diagnostics.

Since 1980-2010, machine learning had been the focus for improving artificial intelligence. Machine learning is a process of data analysis that automates analytical modelling. This is a branch of artificial intelligence uses the idea that systems can understand from data, differentiate patterns, and take actions without the requirement of humans to intervene in the mechanism. With new computer technology, machine learning today has developed very differently from machine learning which had been followed earlier. It has developed a lot from the pattern recognition and

the theory that computers can learn without being programmed to perform a particular task. Researchers wanted to know if the machines could learn from the set of data which are provided to them. The repetitive aspect of machine learning is important because when a model is exposed to new data, it can adapt without any intervention, learning from previous calculations to produce reliable and reproduces decisions and results. It's not new, but it's a science that has gained new dynamics.

In modern generation of artificial intelligence, deep learning is focused on artificial intelligence technology development. Deep learning is a subset of machine learning. Deep learning changes the way we think about presenting the scenarios which the machine is trying to solve. In deep learning, data is trained on its own by training a machine through deep algorithms and processing layers to recognize patterns. It teaches computers to perform human-like tasks such as speech recognition, image recognition, and prediction. Improves the ability to classify, recognize, recognize, and explain data. Part of the current interest in deep learning is due to the enthusiasm for artificial intelligence (AI). In deep learning, the function is already selected according to the neural network. All of this is done through an automated unsupervised learning process. The promise of deep learning is that as new data comes in, it can provide a predictive system that is well generalized, well adapted and continuously improving.

The way in which deep learning and machine learning are different is the way in which the algorithm is learned by the machines. Deep learning automates much of the feature extraction piece of the process, eliminating some of the manual human intervention required and enabling the use of larger data sets.

In 2016, Arend Hintze, assistant professor of integrated biology and computer science and engineering at Michigan State University stated that AI has four types, starting with the task-specific intelligent systems that are widely used today and ending with visceral systems. The categories are as follows:

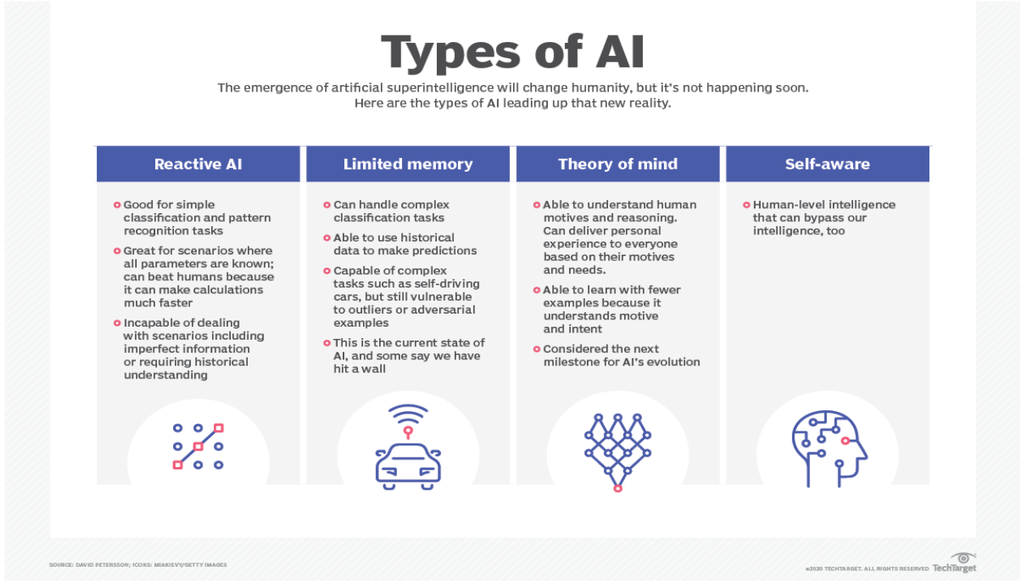

Figure 2: Types of Artificial Intelligence

- **Type 1, Reactive machine:** These AI systems have no memory and are task specific. One example is IBM's chess program Deep Blue, which defeated Garry Kasparov in the 1990s. Deep blue can identify and predict chess board pieces, but because it has no memory, past experience cannot be used to inform future experience.

- **Type 2, Limited memory:** These AI systems have memory so it can be used to predict your past experiences and to make future decisions. Some decision-making functions of self-driving cars are designed this way.

- **Type 3, Theory of Mind:** Theory of mind is a term from psychology. When applied to Artificial Intelligence which means that the system has the social intelligence to understand emotions. This type of AI can infer human intentions and predict behavior. This is the skill that AI systems need to become an integral part of the human team.

- **Type 4, Self-confidence:** In this category, AI systems have a sense of self that makes them aware. With confidence, the machine understands its current state. This kind of AI does not exist yet.

Artificial intelligence is used today in speech recognition, the process of converting human language to text over the phone, known as Natural Language Processing (NPL). Many software such as Siri, Cortona and Bixby are used in mobile phones.

The online chatbot is used by large companies to resolve customer inquiries and then forward them to customer service agents for further clarity. This allows agents to spend more time resolving other queries, and artificial intelligence can resolve many of the initial queries, saving valuable company time.

With artificial intelligence, computer systems can derive meaningful information from digital images, videos, and other visual inputs, as well as information such as face recognition, position detection, and text recognition. Artificial intelligence is used to translate different languages from simple pictures to English in real time. AI-controlled high-frequency trading platforms make thousands or millions of trades per day without human intervention.

What is Energy Efficiency (EE)?

Energy efficiency refers to any method in which less energy is consumed to produce same level of output. It is placed at the second level of the "Energy pyramid", following energy conservation and followed by the renewable energy technologies. As we move up the pyramid the cost and complexity of the energy actions increase. (User's Guide Assessment and fact sheets, 2011)

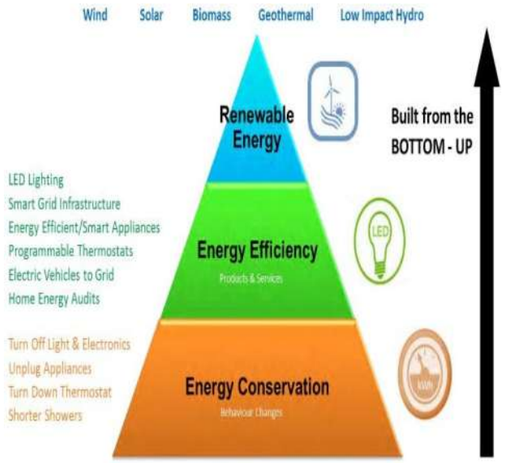

Figure 3: Energy pyramid

While energy conservation and energy efficiency may be related, they have different definitions in the energy world. On one hand, energy conservation is when by adjusting our behavior and habits we save energy. E.g.: Turning off the lights when we leave a room, efficient use of water, unplugging and switching off devices when not in use. On the other hand, energy efficiency is when we use technology which requires less energy to get the same amount of output. E.g.: Using LED bulbs use 70-90% less energy than an incandescent light bulb, smart grid, energy auditing. (6 things you need to know before going solar, 2018)

While it is easy to get excited and promote the use of renewable energy like photovoltaic panels and wind turbines, it is any day better to start with energy conservation and energy efficiency as they are less cost intensive and less complex. (User's Guide Assessment and fact sheets, 2011)

The motivations for energy efficient can be personal, financial, and environmental but its benefits have something to offer to everyone. Energy efficiency is one of the easiest ways to reduce eliminate energy waste, lower energy cost, and reduce pollution. It is also one of the easiest ways to combat climate change, reduces the greenhouse gases emissions and helps maintain financial budgets and cleans the air we breathe. Although renewable energy technologies also help in achieving these objectives, energy efficiency is the cheapest and easiest way to reduce the use of fossil fuels.

The impact and effectiveness of energy efficiency is not only dependent on technology and design but also on the way people use these technologies. A few research done have shown that 30% of the potential energy savings of high efficiency technologies gets lost because of a variety of cultural, social, and economic factors. (Energy Efficiency)

A few ways by which we can use energy more effectively and efficiently in everyday life are given below: (25 Quick & Easy Energy Efficiency Tips)

- Replace the incandescent light bulb with LED light bulbs. An energy star labelled bulb consumes about 90% less energy.
- Use natural light as much as possible.
- Don't leave the electronics on all day long.
- Don't leave kitchen and bathroom ventilation fans longer than required as they replace the indoor air with outside.
- Set the refrigerator temperature as per recommendation of the company to avoid excessive cooling and reducing energy wastage.
- Freezers and refrigerators are most efficient when they are fully occupied. Try to fill them up as much as possible but also avoid over filling as it may cause an obstruction to the air flow and make the appliance work harder.
- Replace the home windows with more energy efficient windows which are made with materials that reduce heat exchange and air leaks which would reduce the need to heat or cool a space. We can also add solar shades or tinted films to reduce heating.
- Adding insulation to the outer walls of a space would help keep the hot air out in summers reducing the need for cooling and it would keep the warm air inside to leave the space to leave in winters reducing the need for heating.
- Use the washing machines at night which would keep the house cool and reduce load on the power grid.
- Don't put your mobile or other appliances on charging overnight.
- Install Smart thermostats which are Wi-Fi enabled that controls the cooling and heating in a space by learning the temperature preferences of the people residing and automatically adjusts to the energy saving temperature when we are away. (What is energy efficiency?)

Artificial Intelligence and Energy Efficiency

Now that we've understood what artificial and energy efficiency is, we'll focus on the role of AI plays to increase the effectiveness of energy efficiency. In these modern times, many cities are determined to increase the energy efficiency of their buildings along with the efficiency at the urban level. The energy industry has gone through many changes over the past couple of years from energy use to energy efficiency. With new advances in industrial processes, multiple sources of energy are now available which can drive forward a more efficient use of energy resources.

With the newest breakthroughs, artificial intelligence is now exploring the possibilities of incorporating itself in industries to increase the prospects of more efficient consumption of energy. The ability to compress and analyse large sets of data can help brands monitor and get the data produced by energy industries to optimize energy consumption. To date, most of the energy sector's transition efforts have focused on hardware: a new low-carbon infrastructure that will replace legacy carbon-intensive systems. Relatively little effort and investment had focused on another important tool for the change, next-generation digital technologies, in particular artificial intelligence (AI), these powerful technologies can be adopted more quickly at larger scales than the latest hardware solutions being used currently there are still persistent barriers to wider implementation related to policy and technology. Researchers and companies are exploring how artificial intelligence could assist in improving the accessibility and efficiency of renewable energy technology and can become an essential enabler for the energy transition.

We'll now discuss about the role of the AI at different scales, i.e.,

a. Macro level: AI in Smart grid

b. Micro level: AI in buildings

a. Macro level: AI in Smart grid

Around 70% of all generated electricity powers factories and buildings with 60% of that is wasted.

Modern power grids gather energy from multiple energy sources, including wind, solar, and coal. Operating and managing massive power grids systems has become more complicated. Artificial intelligence increases efficiency and stability to these energy sources through its ability by analyzing large datasets in a short frame of time. This has led to the development of smart grids, which are designed to handle multiple energy sources at the same time efficiently. These are electrical grids that allow two-way communication between utilities and consumers Smart grids are embedded with an information layer that allows communication between its various components so they can better respond to quick changes in energy demand or urgent situations. This information layer, created through the widespread installation of smart meters and sensors, allows for data collection, storage, and analysis.

For instance, Siemens a German based company has Active Network Management (ANM), is an AI-based software package that autonomously operates grids. It tracks a grid's power fluctuations with different loads of energy, and then accordingly changes the grid to increase efficiency. While previously being carried out with manual adjustments, the software now makes power grids proactive by automatically adjusting its parts whenever new energy producers become available.

DeepMind, a Google sub-branch and UK National Grid have also collaborated to integrate artificial intelligence into the country's electricity system. This joint project is expected to process immense volumes of information from weather forecasts and internet searches to develop predictive models for major surges in electricity demand.

Verdigris Technologies, a US based software company has provided with a cloud-based software platform which uses artificial intelligence for helping its users optimize energy consumption. It was designed for large commercial buildings, this California-based company begins its process with the Internet

of Things (IoT) hardware installation. The use of smart sensors is also prominent which helps in tracking the electricity consumption by being directly attached to the electrical circuits. The data captured by these sensors is sent to the cloud and is then presented to users on a dashboard which can be accessed 24/7 on the go.

Excessive energy consumption is a global problem that is currently being faced by most of the developed and emerging countries alike. To achieve a more sustainable consumption of energy, artificial intelligence is being used to monitor the energy consumption pattern of individuals and businesses. The emerging AI-based start-ups are now offering practical solutions to optimize this energy age. Alphabet's Nest is a smart thermostat for homes that reduces energy consumption by adapting to user behavior. Post its installation in a house, it observes and learns its occupants' habits and then adjusts the temperature accordingly. This nifty little AI gadget has successfully resulted in monthly energy savings of 10-12% approximately.

b. Micro level: AI in Buildings

With the rapid development of computer technology in urbanization, AI has helped provide new methods for the construction industry. With the increasing construction in the country, the energy demand of the building sector has also been increasing. To make the construction more energy efficient and green, many companies have been active in the development of energy efficient technologies. Building Information Modelling (BIM) technology has had an impact on cost control by green energy saving, parameter settings, and information management in construction industry.

BIM technology represents a concept of a perfect information model which encompasses full- circle information sharing of models. It not only focuses on diversified energy efficient strategies at the design stage but also, long term maintenance and energy efficient renovation so that the energy efficiency of a building improves in a continuous process.

One advantage of applying this technology in the design process is that it forms various data and information association system. The technology has powerful information integration capabilities which the designers

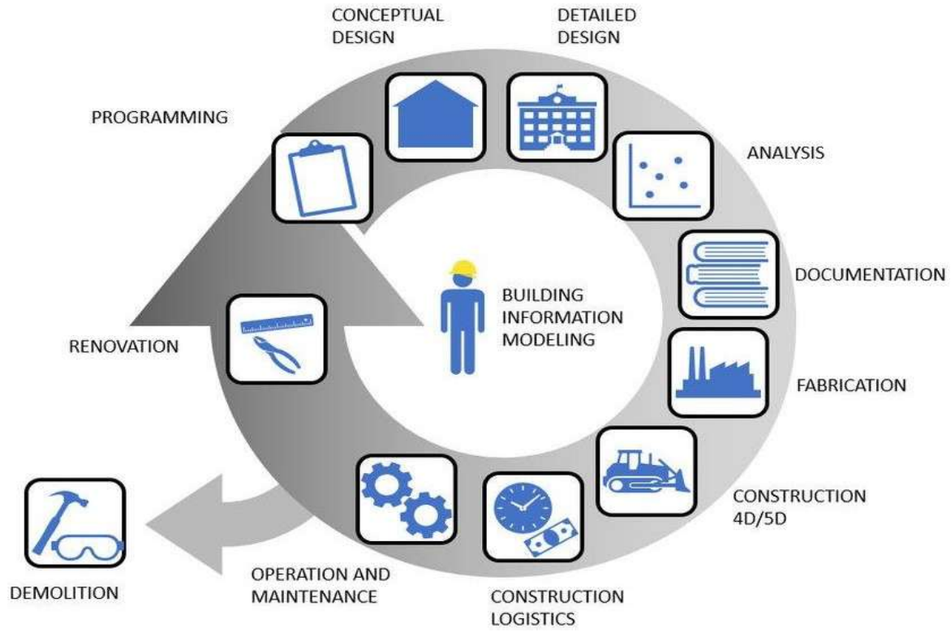

Figure 4 :BIM Technology

use to design, construct, and even operate an energy efficient building. It can provide suggestions for building design optimization. It predicts energy consumption and maintenance cost during the use of the building and provides energy analysis reference to help designers apply energy efficiency building models.

The AI comprises of machine intelligence and intelligent machines. In the design process of machine intelligence of the AI, a large amount of data in the knowledge base is used. The device imitates the laws and thinking process of human beings. Then the intelligent machine comes into play with learning ability and judgement, and thus, obtaining a decision-making ability. Some researchers have used the advantages of Artificial Neural Networks (ANN), and Convolutional Neural Networks (CNN) to explore energy efficient architectural designs.

Artificial Neural Networks (ANN)

ANN comprises of artificial neurons which can simulate the human nervous system and brain. In this type of network, weight factors are used to model the relationship between the input and output vectors. It is better at modelling of multivariate problems, showing the complex relationships between variables. In the designing of an energy efficient building, it is used to predict the electrical load of a structure.

Convolutional Neural Networks (CNN)

CNN is the mostly commonly used neural algorithm. It recognizes data as 2D pixelated images. Its framework supports image recognition tasks and has a pre-trained image recognition model. Through the input learning of massive pictures, it can summarize relevant picture features and connect them with a fixed data. At architectural design level, CNN can identify interior design element features automatically. It can also recognize the architectural furniture along with its characteristics, such as its material, design style, seating capacity etc.

BIM does not generate plans, but inputs the architectural plans into the system, converting it into graphics and data language that the computer is able to understand. It becomes a link between the digital virtual building world and the natural world, in the present and for the future. It balances and combines the complex needs of people for spatial cognition and aesthetics with the energy saving of the surrounding environment of space, human comfort control and other indicators. It includes data collection, artificial intelligence platform and energy efficiency building design.

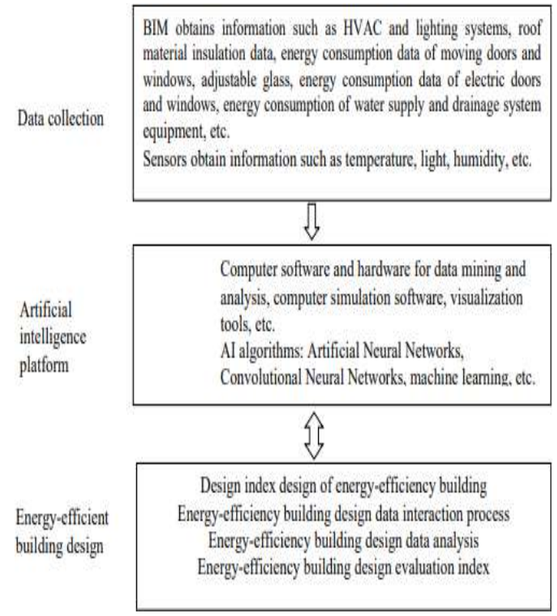

Figure 5: AI and BIM framework diagram of energy efficient building design

It provides relevant parameters such as the local and global weather data, database related to sustainable buildings by researchers, building codes. To finalize a feasible energy efficient building design, the designers require this energy efficiency performance prediction technology. After analyzation of data in real time by sensors, the AI platform of BIM selects one or more AI technologies to operate each building component to achieve the best operating conditions. For a proper prediction, multiple factors, such as light and heat environment, solar radiation, wind environment, behaviors like energy use, window opening etc. need to be considered. The process needs to be integrated and calculated, as there is a huge amount of data of the environment and the user behavior. As the input data is uncertain and has non-linear characteristics, the intelligent prediction technology needs to integrate the building information modelling, parametric programming, and ANN to improve the efficiency and accuracy of the prediction.

First the structure for prediction is prepared based on energy efficiency performance targets to evaluate and predict the building optimization design parameter. It also includes the number of neural networks required, setting the neural network learning algorithm. Then the neural network model training data is generated through field measurement. In the end, training and correction of the prediction model is launched to increase its accuracy. (Long, 2021)

AI in energy efficiency buildings establishes an AI based monitoring platform for construction equipment. Integrating BIM and AI in into architectural design and using energy prediction function provides energy analysis reference for applying energy-efficiency schemes in the building model, optimizing the building design.

CONCLUSION

The evolution of Artificial Intelligence has helped evolve an energy efficient and sustainable environment by forecasting and minimizing the energy consumption, lead to formulation of strategies to reduce the impact on the environment and climate, improved the comfort and safety of the living environment at both the micro and macro levels. AI has so much more potential which needs to be explored to cut energy waste, lower the energy cost, and provide cheap and clean energy that is essential for a sustainable development.

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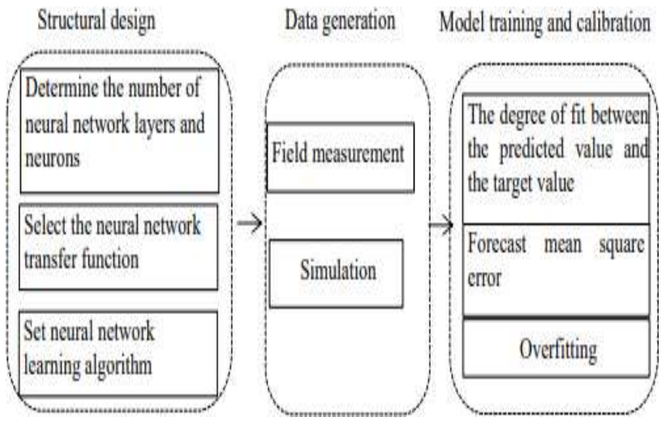

Figure 6: Performance prediction process of energy efficiency buildings

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Environmental Impact of Bitcoin Mining*

Sumangal Chhauda * **Utsav Pilania****

In this paper we examine the environmental impact caused by bitcoin mining and consider some alternatives to mit- igate the environmental toll caused by cyrpto-currency mining.

Index Terms—carbon footprint, bitcoin, mining, greenhouse effect

INTRODUCTION

In the recent years there has been an increase in the amount of cryptocurrencies mined arpound the world. This interest in mining is driven by economic and technological factors. In the first section we consider the method of cryptocurrency mining and consider the impact of mining the leading crypotocurrency, Bitcoin. In the second section we explore the problem in terms of energy consumption and provide alternatives to reduce the impact caused by mining. Finally we conclude by comparing the various proposed changes to the current cryptocurrency mining paradigm.

CRYPTOCURRENCY MINING AND THE ENVIORNMENT

A. Overview of cryptocurrency mining

A cryptocurernсy is a commodity stored in a digital wallet which proves in one way or the other the ownership of the commodity. The cryptocurrency market started with Bitcoin which was announced in an anonymous paper detailing an online decentralised transaction system which provides the ability to settle debts without the involvement of any mediating third party. Each transaction is stored as a part of a ledger which may be public or private or partially-private and is generally stored in an encrypted format.The method used to keep the integrity of the ledger across devices utilises crypto- graphic techniques, or techniques which involve encoding of a message in a way which makes it easy to verify the integrity of the message. This encoding required a large amount of computing power for increasing amount of transaction data and the computers involved in this encoding are called 'mining units'. These mining units are rewarded for proving the com- puting power which maintains the integrity of the ledger by providing them with a predetermined amount of the currency. This process of lending the computing power to facilitate transactions in a secure way and obtaining currency in return is called 'mining the cryptocurrency'. Different Cryptocurrencies have different protocols which are followed by the various mining units. These units consume power on a massive scale and may become the dominant cause of global warming if they remain unchecked. The power consumed has become significant on a planetary scale in the past few years and in the following subsections we breakdown the environmental impact of mining in general.

There has been a large impact on the global warming emissions [1]. There are aound 40,000 kgs of CO2 released per hour due to bitcoin mining in 2021. [2].

B. Mining Energy Requirements

Bitcoin, like a mineral in the Earth's crust, is finite and extractable and, like conventional mining, cryptomining can be energy intensive. The energy required to mine cryptocurrencies

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in a proof-of-work scheme is measurable in the hashrates of the network. Hashrates are the number of calculations (hash functions) performed on the network in seconds. As of August 2018, there are approximately 50 quintillion hashes performed on the Bitcoin network every second of every day. Bitcoin currently consumes around 110 Terawatt Hours per year — 0.55 percent of global electricity production, or roughly equivalent to the annual energy draw of small countries like Malaysia or Sweden. On the basis of our 2017 estimates, Bitcoin alone consumed about as much energy (948MW=8.3 trillion kWh/yr) as Angola or Panama (ranked 102nd and 103rd by total energy consumption). The market capitalization of all cryptocurrencies is approximately US $250 billion, with Bitcoin comprising approximately 50% of that value. If we assume that Bitcoin accounted for 50% of the entire crypto- energy consumed in 2017, then the total 16.6 trillion kWh/yr would be similar to Slovenia or Cuba (ranked 75th and 76th). Bitcoin was 73% of the total power demand of the four currencies in 2017 and 68% in 2018. It is unknown what the other 16 of the top 20 cryptocurrencies also demand.On September 30, 2019, according to the two indexes, the network annually consumed between 73.1 [7] and 78.3 terawatt-hours (TWh) [8] of electricity [9]. However, de Vries pointed out that based on an analysis of Bitcoin miners' sales, it can be estimated that, in fact, the Bitcoin network consumed 87.1 TWh annually on September 30, 2019, exceeding estimates made based on the two indexes and approaching energy consumption of a country like Belgium [9]. We cannot say that currently there were discovered exact means by which energy consumption can be concretely measured, but there are some instruments that can be used to approximate it [10]. However, it should be borne in mind that estimates vary considerably depending on several factors, including hardware efficiency and electricity prices used in the process. For the years 2016, 2017 and 2018, Krause and Tolaymat reported estimates of 283 MW, 948 MW and 3441 MW [10]. For 2017, the study conducted by Dilek and Furuncu shows that except for a few countries on the African continent compared to which Bitcoin uses more energy, Bitcoin's energy consumption accounted for about 13% of Turkey's electricity consumption [11] Some studies conducted in 2018 showed a total electricity consumption of the grid that equaled that of some developed countries and areas, such as Ireland, Hong Kong and even Austria [12]. Ku¨feog˘lu and O¨ zkuran show that in the first half of 2018, the estimated minimum energy demand for the Bitcoin mining process was between 1.34 and 2.80 GW, while the maximum demand was between 5.14 and 13.82 GW [13]. In June 2018, the annual energy consumption was between 15.47 (minimum) and 50.24 TWh (maximum) [13]. Such estimates have attracted the attention not only in the case of scientists, but also of international bodies, such as the European Commission, which has stated that it will monitor energy consumption without using its own tool in this regard [8]. Moreover, there is research, such as that conducted by Citigroup, which claims that if all the amount of electricity needed for the network and transactions with Bitcoin continues to grow, it is possible that the Bitcoin system will collapse [11]. However, we must keep in mind that de Vries shows that miners are more concerned with the size of the profits that can be obtained than energy efficiency. He predicts that as more people interested in profits enter this industry, energy use will increase considerably [8]. At the same time, there have been a number of speculations about the source of fuel used by Bitcoin network, and some of them lead us to Chinese coal, Icelandic geothermal energy and Venezuelan subsidies [14]. The Bitcoin industry is facing a fierce competition. For example, the Swedish company KnCminer has positioned its Bitcoin mining centers at the Arctic Circle to benefit from the local hydropower and cold air at extremely low costs; however, it went bankrupt in the mid-2016 [15]. A study conducted by Cambridge University showed that 58% of Bitcoin mining is done in China, followed by the USA with 16% [11]. Mining is done in China, because here electricity is cheaper; Bitcoin centers in China continue to depend mostly on coal for the consumed energy [16]. The largest such center is situated in Inner Mongolia, an autonomous area of China, with cheap electricity [11].

C. Mining Carbon Footprint

Unlike conventional mining, for which the presence of a metal at a given location is prerequisite, cryptocurrency mining can take place anywhere with the availability of electrical power, an Internet connection and the appropriate hardware. Because the amount of energy required to mine a coin is locality independent, environmental impacts are dependent on the primary energy source utilized.We applied country-specific CO2 emission factors from Malla et al [4]. to the median daily energy requirements of the networks to estimate the geographical effect of the energy mix on the carbon footprint for each of the cryptocurrencies. There is some inherent uncertainty to these values as was published nine years ago and the data may not reflect current conditions. However, we feel that the application of these data is acceptable as the main point is to present a methodology that identifies differences in CO2 emissions based on national energy mixes and the average amount of energy consumed to generate a coin. In this case, energy required per coin mined is the median value of all calculated values from 1 January 2016 to 30 June 2018. As shown in Supplementary Fig. 2, the energy consumed per coin mined (MWh per coin) has increased substantially in the previous two and a half years for all cryptocurrencies. On the basis of the emission factors from Malla, any cryptocurrency mined in China would generate four times the amount of CO2 compared to the amount generated in Canada. Applying the highest and lowest carbon emission factors (India and Canada) as upper and lower bounds and based on the number of coins generated between 1 January 2016 and 30 June 2018 (2,094,699 coins; see Supplementary Table 15), 3–13 million metric tonnes CO2 can be attributed to the Bitcoin network. Using the same approach, we estimate Ethereum, Litecoin and Monero mining generated 300,000–1.6 million tonnes CO2 combined. Thus, for the study period, cryptomining of these 4 is responsible for at least 3–15 million tonnes CO2 emitted, with Bitcoin being the largest contributor. In the short term, this may be problematic, because a large portion of cryptocurrency mining occurs in China [5] Future growth and adoption of these digital currencies is unknown. The worldwide mining of cryptocurrencies is currently performed for self-gain11 but this alone does not preclude it from potentially benefiting society. From a long-term perspective, the mining of cryptocurrencies, such as Bitcoin, is a temporary phasein the proposed lifecycle of the network. Currently, 81% of Bitcoins set to exist have been mined42. However, given the current rate of mining, the last coins will not be mined until approximately 214043. Given the length of time until that point and on the basis of the data presented here, we can assume that the network energy requirements of Bitcoin and Litecoin will continue to increase for the foreseeable future. However, Monero's hard fork (that is, change in code) on 6 April 2018, observable in Fig. 1, indicates a considerable drop in network energy demand. Moreover, Ethereum's future move to proof-of-stake could reduce long-term network energy requirements. Therefore, future environmental impacts for any of the cryptocurrencies on a per-coin-mined basis may be greater or less than those determined in our current assessment. [6]

MAJOR CRYPTOCURRENCIES IN THE MARKET TODAY

In this section we take a look the major cryptocurrencies in the market today. The list of cryptocurrencies on the market keeps on increasing every day and we have only considered the cyptocurrencies which are popular and have a large environmental impact.

A. Bitcoin

Bitcoin is a decentralized digital currency created in January 2009. It follows the ideas set out in a white paper by Satoshi Nakamoto.The identity of the person or persons who created the technology is still a mystery. Bitcoin offers the promise of lower transaction fees than traditional online payment mechanisms do, and unlike government-issued currencies, it is operated by a decentralized authority Bitcoin is known as a type of cryptocurrency because it uses cryptography to keep it secure. There are no physical bitcoins, only balances kept on a public ledger that everyone has transparent

access to (although each record is encrypted). All Bitcoin transactions are verified by a massive amount of computing power via a process known as ”mining.” Bitcoin is not issued or backed by any banks or governments, nor is an individual bitcoin valuable as a commodity. Despite it not being legal tender in most parts of the world, Bitcoin is very popular and has triggered the launch of hundreds of other cryptocurrencies, collectively referred to as altcoins. Bitcoin is commonly abbreviated as BTC when traded. Each and every Bitcoin transaction that's ever been made exists on a public ledger accessible to everyone, making transactions hard to reverse and difficult to fake.

B. Altcoins

- Etherieum - Vitalik Buterin, a programmer, created Ethereum in 2013. Development work began in 2014 and was crowdfunded, with the network going live on July 30, 2015. Anyone can use the platform to develop permanent and immutable decentralised applications that users can interact with. Decentralized finance (DeFi) applications allow cryptocurrency users to borrow against their hold- ings or lend them out for interest without the need for traditional financial intermediaries like brokerages, exchanges, or banks. Ethereum is a blockchain platform that has its own money, Ether (ETH), as well as its own programming language, Solidity.

  Ethereum is a decentralised public ledger for validating and recording transactions as a blockchain network. Users of the network can create, publish, monetize, and use applications on the platform, and they can pay with Ether, the network's cryptocurrency. Insiders refer to the network's decentralised applications as ”dApps.”

- Ripple -Ripple is a real-time gross settlement system, currency exchange, and remittance network developed by Ripple Labs Inc., a technology company based in the United States. Ripple is a distributed open source pro- tocol that supports tokens representing fiat cash, bitcoin, commodities, or other units of value such as frequent flier miles or mobile minutes. It was launched in 2012 and is based on a distributed open source protocol. Ripple claims to be able to facilitate ”secure, instantaneous, and almost free worldwide financial transactions of any size with no chargebacks. The native cryptocurrency XRP is used in the ledger. Numerous additional cryptocurrencies run on the Ethereum blockchain as ERC-20 tokens and have used the platform for initial coin offerings

- Dogecoin - is a cryptocurrency created by software en- gineers Billy Markus and Jackson Palmer, who decided to create a payment system as a ”joke”, making fun of the wild speculation in cryptocurrencies at the time. Despite its satirical nature, some consider it a legitimate investment prospect. Dogecoin features the face of the Shiba Inu dog from the ”Doge” meme as its logo and namesake. It was introduced on December 6, 2013, and quickly developed its own online community, reaching a market capitalization of over $85 billion on May 5, 2021

- ChainLink is a decentralized oracle network that is poised to play an important role in the real-world implementation of blockchain technologies. The purpose of this network is to provide input on a variety of external sources of data. Although blockchain is great at what it does — providing a decentralized, secure ledger for digital transactions — it isn't so great at taking input for things happening outside the blockchain. There are many “off-chain” forces that influence markets, including fiat currencies, credit cards and even the weather and sports scores. As a decentralized oracle, Chainlink can provide input to what's known as smart contracts.

C. Future Currencies

The requirement for any future decentralised currencies on earth should stem from a perspective of sustainability and carbon neutrality. Mainly the requirements of such a currency will be high throughput , low transaction times and low energy consumption. A typical Bitcoin transaction takes as much energy as 40,000 visa transactions. We mush look at chained ledger and proof of trust to reduce the energy requirements in a future cureency which will be established as the new de- facto standard. Such a new currency will be available for the majority of the population who will be incentivised to use the currency because of certain benefits as listed below.

- Carbon Neural
- Fast Transactions
- Low Processing Fees
- Energy Efficiency
- High Throughput
- Large Precision
- Tax Breaks

Such a currency (currency X) will exhibit some features found in traditional payment processing methods such as UPI and VISA such as high energy efficiency while also exhibiting some of the feature of modern cryptocurrency eg. Decentralization , Independent Wallets, Anonymous Transactions. Currency X will be first adapted in countries with high population density and low average incomes to bring transactions into a completely digital age. Low frequency Large Amount payments will still be preferred on the older networks due to the extensive ledger maintained but smaller transactions can be simplified.

ENVIRONMENTAL IMPACT

Considering the fact that cryptocurrencies are defined as a peer-to-peer version of electronic cash, which allow online payments to be sent directly from one party to another without going through a financial institution [18], it can be easily noticed that in obtaining and using any cryptocurrency, andim- plicitly Bitcoin, there are used resources that require electricity consumption. Given the concerted efforts to reduce global greenhouse gas emissions under the Paris Agreement, the information and communications industry (ICT) has received little attention as a significant contributor to the deterioration of environmental conditions [17]. Under the Paris Agreement, which took place in December 2015, 196 countries approved a global plan to reduce climate change in the coming years, proposing to limit global warming to below 2 degrees C [17]At the same time, there have been a number of speculations about the source of fuel used by Bitcoin network, and some of them lead us to Chinese coal, Icelandic geothermal energy and Venezuelan subsidies [14]. The Bitcoin industry is facing a fierce competition. For example, the Swedish company KnCminer has positioned its Bitcoin mining centers at the Arctic Circle to benefit from the local hydropower and cold air at extremely low costs; however, it went bankrupt in the mid-2016 [15]. A study conducted by Cambridge University showed that 58% of Bitcoin mining is done in China, followed by the USA with 16% [11]. Mining is done in China, because here electricity is cheaper; Bitcoin centers in China continue to depend mostly on coal for the consumed energy [16]. The largest such center is situated in Inner Mongolia The figures accompanying Bitcoin transactions are worrying not only from the perspective of electricity consumption, but also from the perspective of greenhouse gas emissions. There are rumors that all cryptocurrencies would “pose a serious threat to the global commitment to mitigate greenhouse gas emissions under the Paris Agreement” [18], especially in the context of gloomy forecasts stating that “Bitcoin emissions alone could push global warming above 2◦C” [19]. However, Masanet et al.

[20] show that the analysis made by Mora et al. [19], which predicts that Bitcoin mining may lead to an increase in global warming by more than 2 ◦C in the next 11-22 years, is not entirely plausible. The effects of Bitcoin processes, however, are visible. Stoll et al. emphasized that the carbon footprint generated by Bitcoin mining “sits between the levels produced by the nations of Jordan and Sri Lanka, which is comparable to the level of Kansas City” [21].

SOME POSSIBLE SOLUTIONS

A possible solution to the decentralized finance problem can be found in the way we have been able to miniaturize semiconductors. Semiconductors were large and bulky and used to consume large amounts of power in 1980's with each transistor requiring 100 milliwatts to each

transistor today requiring less than a picowatt. This reduction in energy is due to the smaller scale and integrated production of transistors with improvements in the photo-lithography systems. We can apply the same Moore's principle to reduce the hashing requirements of the network by Telescoping Transactions in a single simplified transaction which will be verified by the entire network. We propose a new technique to improve the energy efficiency of existing networks by creating secondary settlement layers on top with improved energy efficiency. These "stacked" layers can tether themselves to the larger network by decentralized clearinghouses. These clearinghouses will be an agglomeration of hashing power of the network and each node will remain in the network voluntarily in exchange for the partial reimbursement in accordance of the hash rate of the node. These layered networks may utilize different transaction technologies which may be more efficient and better than the network below them. The users can always move up or down the network but the general consensus of experts agree that we need to immediately tackle the environmental impact of the mining, which may incentivise governments and other regulatory bodies to encourage vertical transfers of wealth in return for a tax-break or other incentives. Early adopters to a layer benefit from being owners of a generally appreciating asset for a better price. Clearinghouses which will facilitate vertical movement of crypto, either layer up or layer down benefit from charging transaction fees in return for the desired currency. Trusted Clearinghouses which will form can then utilize their funds to further purchase mining units an increase their hashing power. Clearinghouses with high hashing and low transaction fees would become the popular choice amongst the users. Clearinghouses which behave in an unfair or fraudulent way will be rated poorly by their customers in a decentralized rating platform which evaluated the success of a predetermined smart transaction. We propose to call this network ZENROSE-DART(ZDART). This network will act as a bridge between the current currencies and future currencies which are more energy efficient or utilize Renewable sources of energy to mine coins. This is different from a crypto-exchange platform in a few ways.

- Clearinghouse is a decentralised aggregation of all nodes which obey the same currency exchange rules like trans- action fees, Smart Transaction Evaluation and agrEement Protocol(STEEP), clearing frequency etc. as opposed to an Exchange which is a single entity.
- Clearinghouses cannot accept or deny any exchange re- quests , they merely process them.
- Exchanges can determine the tethering of price between two or more cryptocurrencies whereas Clearinghouses cannot determine the exchange rate of currencies which is determined solely by the price the decentralised market is willing to pay for in exchange of the other currency.
- Hashing power of the Clearinghouse determines the amount of transactions it handles as opposed to the collateral held by the Exchange

This proposed solution involving Clearinghouses, Vertical networks, Smart Transaction Evaluation and Agreement Pro-tocal (STEEP) and Zenrose DecentrAlised Trust and Ratings (ZDARTS) will be discussed in much more detail in a future paper.

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Urban Sprawl- It's Effect on Environment

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'City Growth' has recently become the subject of much debate and policy initiatives from government agencies and non-profit organizations. However, there is little agreement on many aspects of the situation: its definition, its implications — both non-financial and economic models and policy predictive distribution, and decision-making models that can assist policymakers in exploring other development schemes. which may have spreading characteristics.

In particular, there is little research on urban sprawl that focuses on measuring and comparing environmental impacts. The purpose of this paper is twofold: to study the literature on urban sprawl, to focus on environmental factors and to identify a potential research agenda for a large number of analytical tools for scholars and staff to comment, monetize, model, and make planning decisions about spread.

Key Words: Environment, non-profit organizations

INTRODUCTION

"If earth was an apartment, we wouldn't be getting our security deposit back" - Jim Shubert, a rising Philadelphia comedian made us realize that if we harm our mother planet, we are harming our own well-being. However, people can be as easily infected as any other species and our well-being and survival depend on a healthy world. The idea of the spread of Urban arose at the end of World War II, as well as the expansion of the underground space that took place during this period and was first featured in the 1955 article ,The Times. adverse environmental effects that lead to adverse effects on the environment. Loss of land, loss of habitat and subsequent reduction of biodiversity is one of the major consequences of urbanization. Due to the random growth of cities and the emerging megacities there are many regions in India with high birth and migration rates are therefore facing environmental problems.

In this research paper we will try to focus on what the sprawl is, where it comes from, what the causes, symptoms, and effects are, and how one can measure it to diagnose and possibly find solutions, if there is a problem. And the main purpose of this research paper is to provide a broad and detailed theoretical view of the possibility of urban sprawl, in order to sort out the meanings and various parts of the terms involved, before one can begin any dynamic analysis on the subject. In particular, when it comes to measuring stretchability, a lack of understanding about the concept of flexibility hinders the use of the most appropriate method of methodology, as well as achieving significant and legitimate results.

Urban Sprawl- The origin of the term

The term urban sprawl that originated after World War II is central to the building of modern public perceptions of urban life. The Urban sprawl concept originated at the end of World War II, close to the expansion of the underground ecosystems that occurred during this time.

In India, with countless population growth and migration, urban population growth and urbanization have also taken place. More and more cities and towns are becoming more and more dependent on changes in land use on highways and in suburbs. This development that is dispersed outside urban centres and valleys connected by highways and rural areas is described as a sprawl (Theobald, 2001). Urbanization is a form of big city growth that responds to species that often confuse economic, social, and political power and the local environment. Some of the causes of growth include - population growth, the economy, patterns of infrastructure programs such as road construction and the provision of infrastructure using public funds that promote development. The direct impact of this urban sprawl is a change in land use and regional land coverage.

Sprawl often fall into some kind of developmental impact such as loss of arable land, open space, and environmentally sensitive habitats. Also, sometimes the spread is measured by the growth of a city or town (radial spread). In simple terms, as the population grows locally or in the city, the city boundary grows to keep pace with the increase; this expansion is considered an extension. Sprawls usually occur on the outskirts of the city, on the outskirts of the city or on the highways.

Meaning and Definition of Urban Sprawl

The construction of suburban housing, facilities and roads, and the provision of services to urban dwellers and workers are important elements of gross domestic product in industrialized countries. With so much growth in the suburbs of the metropolitan area, many services and services are directed there. The development of "near the city" is becoming more and more apparent in the design of the project. Many urban housing pamphlets include the same or similar models that live in parcels with the same or similar details. Measurements reduce costs and speed up construction by allowing you to order materials (usually from abroad) in bulk. Linking the practice of design projects to the growing influence of globalization is done by Some city planners and social scientists . Urban sprawl (also known as suburban sprawl or urban invasion), by its literal definition, has unlimited residential, commercial, and road construction in many urban areas beyond countless land expansions. Growth, but no city concerns. Urban sprawl is another term that basically describes urban migration. Learn about migration from densely populated cities and communities to the development of densely populated settlements in rural areas. As a result, the city and its suburbs have expanded to many rural areas. In other words, urban sprawl is defined as a low density of residential and commercial development in vacant lots. In most cases, people leave these places to find more livable places. That was the way the world was from the beginning.

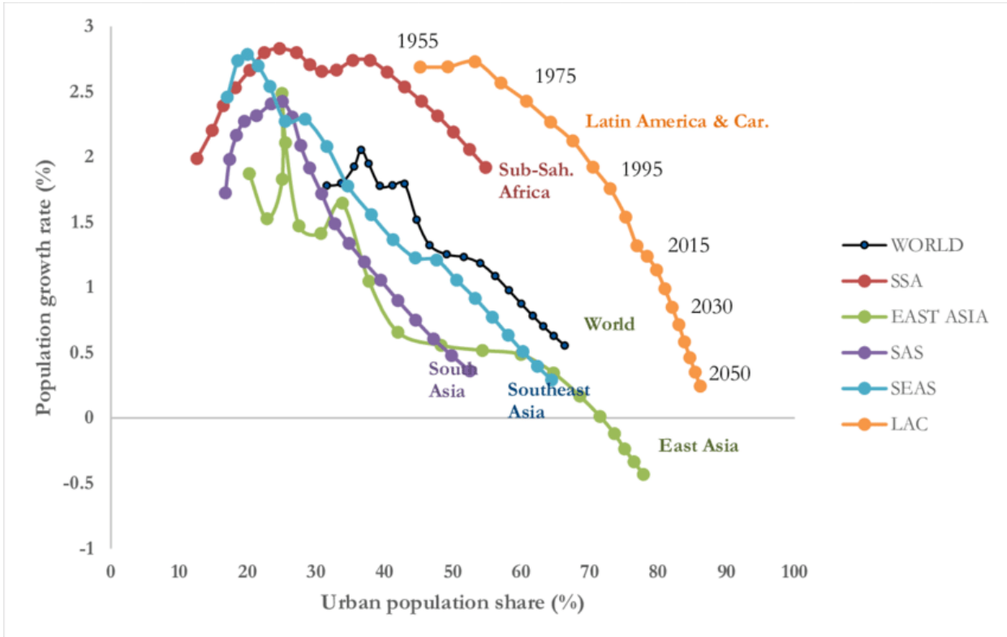

Fig: Population-growth-and-urbanization-in-developing-countries-by-major

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2.3. Urban Sprawl – Is it Good or Bad ?

Urban sprawl is a common type of development with many negative impacts on the environment, public health, and urban economy. The development of urban sprawl increases the need for transport and reduces the available space for agriculture. This leads to more transportation pollution and, according to data, more food is exported. This increases the risk of hazardous transport and the risk of importing unprocessed food at the highest level required in the United States and other developed countries.

India is projected to add 404 million to its urban population between 2014 and 2050. According to the United Nations World Urbanization Outlook Report 2014, the annual growth rate of India's urban population from 2010 to 2015 was 1.1%, the highest among the major economies. Indian cities have already contributed more than 62% to GDP. The socio-spatial hierarchy of the country's larger cities is getting deeper and deeper, even if income, access and opportunity inequality remain unchecked. Marginalization and ghettoization continue to be surprisingly common in Indian cities, especially in Tier I cities, where immigrants from many countries to cities are suffering. According to the United Nations, two Indian metropolitan areas, Delhi and Mumbai, were included in the world's 10 metropolitan areas in 2014, and another metropolitan area, Kolkata, will be in the top 15 of the world by 2030. Affordable housing plays a central role in building a comprehensive city. India's ambitious Housing for All project aims to provide housing for all poor urban households by 2022. Government reports indicate that more than 90% of housing shortages in urban areas of India are affected by the economically vulnerable and low-income parts of the population. At the same time, 7.5-rack apartments in Mumbai metropolitan area, metropolitan area, Bengaluru, Puna, Chennai, Hyderabad and Kolkata are unsold, indicating high demand for supply discrepancies. Demand is primarily in the affordable housing segment, while supply is higher in the higher-priced segment. With only a few selected people enjoying development, the city of India has become a breeding ground for violence and criminal activity, often suspected to be a direct result of urban deprivation and misery. In the fast-paced immigrant cities of India in the 21st century, there is considerable potential for major cracks in the social structure of Indian urban geography. In addition to this inefficient ULB, unplanned and unstable construction work, half-finished public transport, breathtaking air, catastrophic traffic noise, vulnerable populations, inhuman slams, Growth inequality, increased crime, underemployment, camouflaged employment, and what we have is urbanization. It's chaotic, dangerous, and almost unwise.

As a large part of India, Chennai is full of comparisons. India's fourth largest city is not only an important business centre but also a magnet for tourists boasting of UNESCO sites and tropical wildlife: In the East you will find unique mangroves and in the West there is a tropical forest with rare species of plants and animals. But there is an ongoing social and environmental struggle. Over the past three decades, the population has doubled to over eight million. As is often the case, many newcomers are poor in rural areas, seeking a better life, and living on the outskirts of a city where housing is affordable. Rapid population growth has led to overcrowding, pollution and problems with garbage and water shortages. Urban sprawl also affects the environment, for example the number of endangered species. Water supply and sanitation are very important for maintaining urban life, regardless of income status. Tap water, which is only available to about half of the city's population, is currently distributed for only a few hours a day.

Dharavi slums are located in Mumbai, India (formerly Bombay). The largest slums in India and Mumbai are known as Dharavi. In Dharavi, one million people are packed into one square mile. In the suburbs of Dharavi, newcomers will settle in wastelands next to water pipes in the slums. They settled illegally in the midst of garbage in uninhabitable lands. During the rainy season of the monsoon, these people have major problems living in this lowland fringe. Many of the people here come from many parts of India due to the push and pull factors of migration. In slums, people have to live with many problems. People have to go to the bathroom on the street and the sewer is open. With 4,444 children playing in wastewater, doctors take care of 4,000 diphtheria and typhus daily. In addition to open sewers, there are water pipes that can crack and take in sewage. The slums of Dharavi are based on this aqueduct built in an old garbage dump. People are

not planning this settlement and there are no legal claims on the land. Slums also contain toxic waste, such as extremely dangerous heavy metals. Dharavi is made up of 12 different parts of the city, with no maps or road signs. The farther away from the edge of the Dharavi, the more durable and sturdy the structure will be. People live in very small apartments (eg 12 x 12 feet) and often have many members of a large family. Many architects and planners claim that this slum could be the solution to many of the problems facing the world's largest cities. Water is a big problem for the people of Mumbai. The stand pipe is watered and will be on for 2 hours at 5:30 am. These stand pipes are shared by many people. Garbage is ubiquitous, and in most areas there is no hygiene or excrement, and rats can be found on the streets. 500 people share a public toilet. There is also a problem with the famous cloth washing area. Despite its social character, wastewater is filtered into washing water.

All these results in creating many problems - for example inadequate waste disposal, high incidences of disease and conflict. Rapid urbanisation also puts pressure on transport systems and job opportunities. This can result in people working in poor conditions, for long hours and low pay.

Urbanisation India and its problems

Urban Sprawling has been an instrument of economic, social and political progress, it has led to serious socio-economic problems. Poverty, unemployment and underemployment are intensifying among rural immigrants, beggars, thefts, fraudsters, robbers and other social evils. Urban sprawl is rapidly invading valuable agricultural land. India's urban population had already exceeded 285 million in 2001. By 2030, more than 50% of India's population is expected to live in urban areas. The following issues need to be emphasized.

Overcrowding This is a situation where too many people live in too few spaces. Overcrowding is a natural consequence of overcrowding in urban areas. Of course, densely populated cities in small areas are expected to be overcrowded. This is well illustrated in almost every major city in India.

For example, Mumbai has one-sixth of an acre of open space per 1,000 inhabitants, but the Mumbai Great Master Plan proposes four acres as standard. India's big cities are "absolutely" and "relatively" overcrowded. Absolutely in the sense that these cities have a really high population density. The problem of providing services and other facilities to urban dwellers, even if not very dense, is relative in that sense. Delhi is the highest in India, with 9,340 inhabitants per km² (2001 census). This is the total population density of Delhi's Union Territory. The population density in central Delhi can be much higher. This puts a lot of pressure on infrastructure facilities such as housing, electricity, water, transportation and employment. Efforts to rescue Delhi by developing a ring city have not been as successful as necessary.

Unemployment The problem of unemployment is as serious as the housing problem above. The unemployment rate in urban areas of India is estimated to be 15 to 25 percent of the workforce. This percentage is even higher for educated people.

One of the main causes of unemployment in cities is the mass migration of people from the countryside to the cities. Migration from rural areas to cities has been going on for a long time, but it wasn't as big a problem as it is today. The general poverty of rural populations drives them to urban areas in search of livelihoods and in the hope of a better life. However, the growth of economic opportunities has not kept pace with immigrants. The limited capacity of urban areas has created ample employment opportunities and has been unable to keep up with the rapid growth of the urban workforce. Federal and state government efforts to create rural employment opportunities and curb large-scale rural to urban migration have been unsuccessful.

- Slums and Squatter Settlements

  The natural consequences of unidentified, unplanned and arbitrary growth in urban areas are the growth and expansion of slums and squatter settlements, which are the ecological structures of Indian cities, especially metropolitan areas. It is a remarkable feature.

  The combination of rapid urbanization and industrialization has led to the growth of slums. The surge in slums is due to a number of factors, including a shortage of developed land for housing, high land prices that are inaccessible to the poor in the city, and a large influx of rural migrants into the city in search

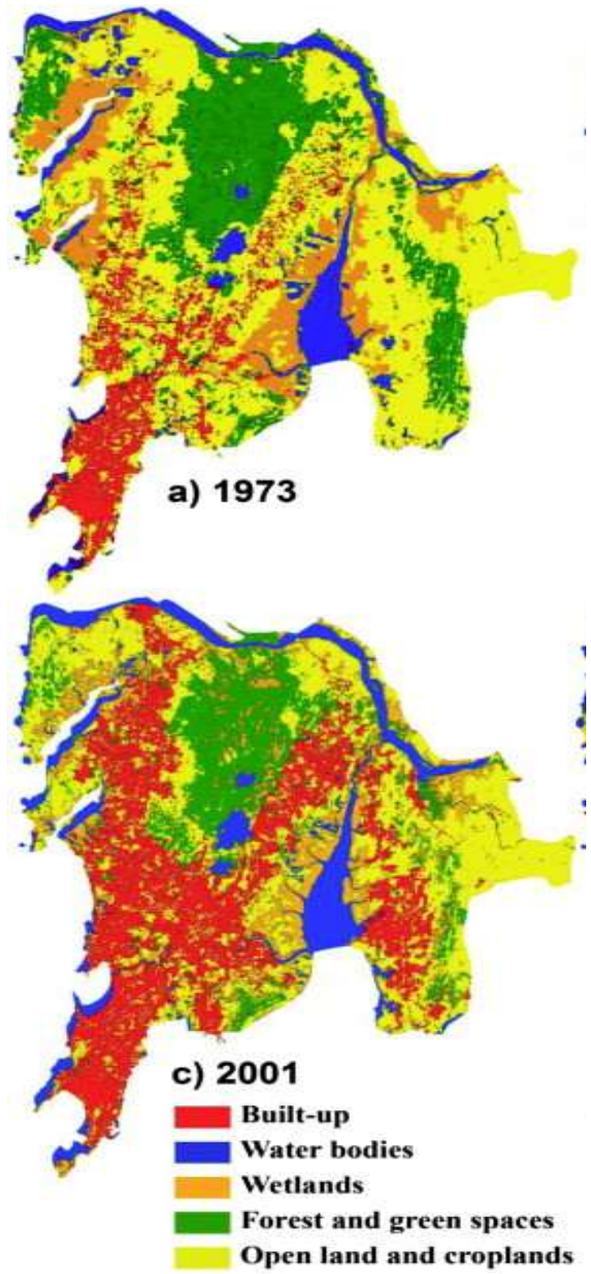

Fig: Urbanization process in the megacity Mumbai, India

of work. Several efforts by the federal and state governments to reduce the number of slum dwellers have significantly increased their growth and put great pressure on existing public facilities and social infrastructure.

Socially, slams tend to be isolated from other urban societies and exhibit pathological social symptoms (substance abuse, alcoholism, crime, vandalism, and other deviant behaviors). The lack of integration of slum dwellers into urban life reflects both lack of skills and cultural barriers. Therefore, slums are inhabited not only by huts and dilapidated buildings, but also by people with complex social networks, sharp socio-economic

hierarchies, dual groups and isolated spatial structures. In India, slums are one- or two-room huts, predominantly occupying state and public land. Slam houses are made of clay or brick walls, the low roofs are mainly covered with galvanized iron, sheet metal, bamboo mats, polyethylene, sackcloth, thatched roofs, no windows or fans, no public facilities. All slums are in very unsanitary condition. They have poor toilets that arise from shallow holes between three or four huts and hang in front of them with burlap curtains. When the pits overflow, excrement spreads throughout the area and is rarely cleaned. Children give stools everywhere in the slums. The slums have virtually no drainage channels and are characterized by drains and puddles. Slum residents do not have access to tap water and rely primarily on flat hand pumps for water supply. Such hand pumps are usually dug in the middle of an old and dirty pool. People wash clothes and tools under a hand pump. All dirt around the hand pump penetrates the ground and contaminates groundwater. This contaminated groundwater is drained through hand pumps, which adversely affects the health of slum dwellers.

As a result, people suffer from water-borne diseases such as dysentery, diarrhea, malaria, typhoid fever and jaundice. These illnesses plague people all year round. Children with bloated abdomen or skeletal starvation, many of whom have polio, are common. Most slums are located near drainage channels (nullahs) that contain dirty, stagnant water. The 4,444 billion flies and mosquitoes that flock to these drains cause infections. These drains are used by residents as open toilets and are always shut off. Such drainage channels (nullahs) pose a serious threat to human health. The slums are known by different names in different cities. In Kolkata they are called Basti, in Delhi they are called jhuggi jhoparies, in Mumbai they are called Jhoparpattis or Chawl, and in Chennai Cheri.

- Sewerage Problems

  Urban areas in India often suffer from inadequate and inefficient sewage systems. Not every city in India is completely wastewater-free. Lack of local government resources and illegal growth of cities are two main causes of this sad situation.

  According to the latest estimates, only 35 to 40% of the urban population has the privilege of owning a sewer. Most cities have old sewers that are not properly maintained. Sewer pipes often collapse or overflow. Most cities do not have the proper equipment for wastewater treatment, which flows near rivers (like Delhi) or into the sea (like Mumbai, Kolkata, Chennai), thereby polluting the water. In most Indian cities, water pipes run very close to the sewers. Leaks cause water pollution and lead to the spread of some water-borne diseases.

- Trash Disposal

  As the number and size of Indian cities grows, the problem of waste disposal is becoming more alarming. The large amount of waste generated from our cities is a serious health problem. Most cities do not have proper waste disposal arrangements and existing landfills are full. These landfills are breeding grounds for invading diseases and countless poisons. Waste rots outdoors, leading to diseases that carry flies and mice, and dirty, toxic liquids called leachates that leak from below and pollute groundwater. People who live near rotten garbage and untreated sewers are vulnerable to various illnesses such as dysentery, malaria, plague, jaundice, diarrhea, and typhoid fever.

- Urban Crimes

  Modern cities are places where people from different fields who are not close to each other meet. Like any other problem, the problem of crime increases as urbanization progresses. Indeed, the increasing trend towards urban crime disrupts the peace and tranquility of cities, making them especially dangerous for women.

  Increasing materialism, consumerism, daily competition, selfishness, waste, horrific socio-economic disparities, and growing unemployment and loneliness in the crowd are some of the main causes of the alarming tendency of urban crime. Is it? Poor, poor, slum dwellers are not the only criminals. Young people in the Welted family are also quickly committing crimes to make money

and meet the demands of luxury living. Occasional failures in life also draw teenagers into crime. The problem of urban crime is more complicated in today's world, as criminals are often protected by politicians, bureaucrats, and the elite of urban society. Some criminals use their money and strength to gain high political status. According to a study by Dutt and Venugopal (1983), urban violent crimes such as rape, murder, kidnapping, tactics and robbery are more prevalent in the north central part of the country. White-collar crimes (theft, fraud, back office, etc.) are also concentrated in the northern central part. Poverty-related crimes are widespread and are predominantly concentrated in the cities of Patna, Dalbanga, Gaya and Manger. This may be due to the prevalence of poverty in the region. However, the latest polls show that Mumbai and Delhi have high crime rates in 35 cities. 31.8 percent of Mumbai citizens and 30.5 percent of Delhi were victims of crime. Sexual assault was higher in Mumbai (3.5%) than in Delhi (1.7%). Corruption fares are low in both cities, with 22.9% facing bribes in Mumbai, compared to 21% in Delhi.

- Urban Pollution

  With rapid urbanization, industry and transportation systems are growing disproportionately. These developments are primarily responsible for pollution of the environment, especially the urban environment. If our city continues to deteriorate, the quality of life of the city deteriorates, and the urban environment is irreparably damaged, we cannot imagine India being economically, socially and culturally strong. .. In fact, cities form the backbone of economic expansion, and urbanization is actively seen as a driving force for economic growth and a subject of socio-political change. The proportion of urban income in total economic income is estimated to be 60%, and per capita income was about three times the per capita income in rural areas. However, this is inadequate due to high living costs and widespread economic inequality in urban areas. The rich become rich and the poor become poor. Several steps have been taken to address the challenges of the urban crisis, but with little or no success.

  Almost all major urban development programs suffer from resource-depleted chronic diseases. From the beginning of the planning period, urban development has a low development agenda, with only 34 percent of total planning efforts spent in the urban sector. In 1988, the National Urbanization Commission recommended spending at least 8 percent of the planned spending on the urban sector.

Solution to the problem Urban Sprawl

Urban sprawl usually blocks a quarter of business establishments, forcing people to rely on cars. The sprawl phenomenon is the expansion of development from urban to rural areas. It is usually disorganized and poorly planned, resulting in unsustainable forms of development. Urban sprawl is causing havoc in natural lands, ecosystems and communities. "Inefficient land allocation and failure to shrink space between and around buildings have fragmented the habitat that remains behind the buildings," Ball State University said. Fortunately, there are solutions to urban sprawl through smart growth, New Urbanism and community engagement.

- Education

  One of the biggest problems with urban sprawl is the lack of education. Educated about the negative effects of urban sprawl, communities are more likely to take action to prevent irresponsible development. Communities need to understand the drawbacks, such as increased traffic due to increased commuters and lack of public transport leading to increased pollution. Affected are community and family-owned businesses that are being replaced by large retail stores. Other issues include tax increases, housing development of agricultural land and conversion to shopping centres. As communities are educated, they are more likely to act.

- Community Action

  Communities can be a solution to urban sprawl through participation and action. The community can call on the community council in the local project lobby to vote for more sustainable development methods. Community members can also ask local governments to work with organizations that

promote smart growth and New Urbanism. With sufficient public participation, governments are much more likely to support voters. Investors can buy land facing urban sprawl, but local media can help raise awareness of the shortcomings and impacts of urban sprawl. Development-affected entrepreneurs and locals also express their position by providing examples of how the sprawl phenomenon affected them, or how it will affect them in the future. can do.

- Smart Growth

  Smart growth is designed to combat urban sprawl by developing it in a way that does not endanger land or communities. Planners and architects who drive intelligent growth want to develop a stronger sense of location through more compact development, also known as mixed use. In mixed-use development, instead of separating individual areas, you combine residential areas with work and commercial areas. This allows for more pedestrians and public transport, rather than traffic and pollution. The community can also consider implementing smart growth auditing. It provides regional and community assessments to assess how existing policies are in line with smart growth principles.

- Work with your Neighbours

  Land use decisions are best made when looking at the entire area, not just part of it. Development affects not only your community, but your north, south, east, and west communities. Communities can be created within political boundaries, but ecosystems, rivers, wildlife habitats, and the air you breathe do not follow those boundaries.

- A new way of thinking

  Creating a better planned community also encourages alternative modes of transportation such as buses, trains, bicycles and walks. By providing a safe, reliable and efficient alternative to traveling by car, cities can create a better atmosphere for living while protecting the environment. Minneapolis is in the early stages of light rail deployment, and the city also has a bicycle promotion program called the Yellow Bike Union. Bicycles are stored in public places such as local stores, and anyone can rent them all day long, like books in the library. Our community grows and change is unstoppable. But we can grow randomly, or we can plan growth and move to an efficient, environmentally friendly, and comfortable community to live in and visit. Citizens and politicians will speak on important issues in this year's elections, and urban sprawl could be at the top of many people's lists.

URBAN SPRAWL AND ITS IMPACT ON SUSTAINABLE URBAN DEVELOPMENT

Urban sprawl has resulted in unsustainable urban development patterns from a social, ecological and economic perspective. Urban expansion (land use accumulation), primarily caused by population growth, is due to the replacement of pristine grasslands and forests that provide essential ecosystem services such as carbon sequestration and biodiversity promotion with ecosystem services. It has a negative impact on ecosystem services. Raise the land cover. Today, the increase in the world's urban population is seen as a direct factor in the unprecedented urban sprawl seen primarily in cities in the south of the world. As the population of the city center grows, the need for infrastructure such as transportation, water and sewage, and facilities such as housing, commerce, health, schools, and recreation increases, most of which is known as urban sprawl.

The United Nations (UN) has adopted the 2030 Agenda for Sustainable Development. It formed the basis for 17 Sustainable Development Goals (SDGs) and 230 indicators in 2015. According to the United Nations (2018), the SDGs and their respective indicators are considered as products of society resulting from cooperation and a common desire to balance human development and environmental protection. And these social, economic, and environmental aspects can be used to create a variety of indicators for sustainable urban development. 2019b, Zhilin et al. 2020). Therefore, it is necessary to understand the needs and concerns of different groups and individuals, especially in areas subject to ethical or political constraints. While social disciplines such as psychology and economics undoubtedly play an important role in urban policy, satellite remote sensing images are useful on a verifiable basis to support administrative decisions in urban planning and management. We will continue to

provide information. It is becoming increasingly clear that social media data can provide equally important and effective governance or guidance clues when it comes to city planning and management. In the context of sustainability, the natural environment and its ecosystems are the delivery medium of all products and services that humans depend on for survival, but due to dynamic climate change, these services have since become effective and effective. Changed in terms of quality assurance (Kora and Covina) 2019). Ecosystem services are the benefits that ecosystems provide to both human society and the planet itself, in terms of regulation, supply and cultural importance. These include utilities such as food, water, wood and textiles. Regulate services that affect climate, floods, illness, waste and water quality. Cultural services that provide recreational, aesthetic and spiritual benefits. Support services such as soil formation, photosynthesis and nutrient cycle (Huq et al. 2019; Sedami et al. 2015; Terfa et al. 2020; Twumasi et al. 2019; Zhang, Weng, Shao 2017; Zhang. 2019b). Humans rely on these ecosystem services because they are so important to human well-being.

FINDINGS / CONCLUSION

The concept of urban sprawl is associated with the process of transforming the density gradient lines of urban and residential activity, and as the phenomenon occurs, the becomes increasingly steep. To emphasize the importance of to the transformation process, rather than the final urban composition of the expanding city, the phenomenon needs to be treated as a verb rather than a noun, which describes the process of urban growth to differentiate. Form [Couch et al. 2007]. In the early 1980s, the European Commission officially raised concerns about the spread of urban sprawl across the continent, as it made a negative contribution to the achievement of sustainable development imposed by the United Nations. Pressure on modern city planning to reach this goal, , has shown no positive effect. After World War II, with uncontrolled urban expansion remains the norm in many European countries. However, as concerns about the spread of in sparse cities increase, there is an increasing need to accurately analyze the phenomenon in the context of in Europe in order to develop efficient territorial policies for . In the second half of the 20th century, Europe, especially Southern Europe , entered a period of rapid population growth and urbanization of . In recent s, the former slowed down and was significantly more stable, while the latter is still increasing. All of this suggests that urban sprawl has been going on in the region for several years.

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Supplemental information related to this paper is available at the Journals Online website: http://dx.doi.org/10.1175/EI-D-15-0040.s1.+ Corresponding author address: Prof. A. P. Dimri, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi 110067, India. E-mail address: apdimri@hotmail.com

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The Effect and Analysis of Carbon Footprint

Priya Bhardwaj*

This paper focuses on the exploration styles and way involved in carrying out studies on different types of carbon vestiges. Likewise, a relative study of different carbon footmark assessment norms was carried out to identify their parallels, differences and scarcities. Pretensions, principles, exploration boundaries, computation styles, data selection and other aspects of associations footmark and product carbon footmark were analysed, independently. Organizations carbon footmark assessment norms — ISO14064 and Greenhouse Gas (GHG) protocol and product carbon footmark assessment norms — PAS2050, TSQ0010, ISO14047 and Product and Force Chain GHG Protocol were analysed comparatively. The selection of GHG, system settings, quantification and carbon footmark, selection of date and treatment of specific emigrations are the most important part of the study of the carbon footmark and assessment norms, especially for associations and products. Guidelines had been made on these issues from being assessment norms, but farther enhancement is still demanded.

Key Words: Greenhouse Gas (GHG) protocol, . Pretensions, principles, exploration boundaries, computation styles,

INTRODUCTION

Global warming is a fact, and evolves into a full range of issues of politics, frugality, society, technology, terrain and ecology on a global scale from a single scientific problem (1). It becomes one of the tremendous challenges for mortal being. Global warming and a series of problems have aroused violent enterprises of the transnational community. A series of transnational conventions like the United Nations Framework Convention on Climate Change (1992), The Kyoto Protocol (1997), Bali roadmap (2007), Copenhagen Agreement (2009) were inked, which reflect the determination and sweats by the government in response to global warming. According to agreement, countries have made commitments to emigration reductions and action plan. Therefore, the innovative generalities of low- carbon frugality, low- carbon megacity, low- carbon life, carbon trade, carbon duty, means to reduce carbon emigrations come the important development strategy of the whole world. Affiliated exploration studies were carried out by governments, associations and experimenters on the profitable, social and other aspects, and all the stakeholders are trying to find a low- carbon development path. Current exploration studies on the low- carbon issue, concentrated on emigrations account and reduction, carbon emigrations trading platform, carbon duty and carbon emigration policy (2) (3) (4) (5), have made a lot of achievements. The carbon footmark and assessment standard is one of the most introductory and pivotal exploration in low- carbon exploration. Still, due to this issue harmonious results haven't been achieved yet, and hence, concerned exploration were greatly affected. Exploration on the carbon footmark and assessment norms has come a hot content for governments and experimenters.

This paper focuses on the exploration styles and way involved in carrying out studies on different types of carbon vestiges. Likewise, a relative study of different carbon footmark assessment norms was carried out to identify their parallels, differences and scarcities.

BACKGROUND

Concept of Carbon Footprints

The carbon footmark originates from the conception of ecological footmark, which is a measure of mortal demand on the Earth's ecosystems. It's a standardized measure of demand for natural capital that may be varied with the earth's ecological capacity to regenerate. It represents the quantum of biologically productive land and ocean area necessary to supply the coffers a mortal population consumes,

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and to assimilate the associated waste. Using this assessment, it's possible to estimate how important of the Earth (or how numerous earth Earths) it would take to support humanity if everybody followed a given life.

Still, a extensively accepted and concrete description of a carbon footmark doesn't live at present. But the notion of what a footmark is does live. A substantially honoured conception was proposed by Wiedmann et al. the carbon footmark is a measure of the total quantum of carbon dioxide emigrations directly and laterally caused by an exertion or accumulated over the life stages of a product. Meanwhile, the carbon footmark is a measure of carbon dioxide emigrations (6) (7).

Groups and styles of carbon vestiges

The carbon footmark substantially applies to particular, products, associations, metropolises and countries, etc (6) (7) (8). A particular carbon footmark is carbon dioxide emigrations caused by each person's apparel, food, casing and business of diurnal life. A product carbon footmark measures the hothouse gas (GHG) emigrations over the entire life of a product (goods or services), from the birth of raw accoutrements and manufacturing right through to its use and the final play, recycling or disposal. An organizational carbon footmark measures the GHG emigrations from all the conditioning across the association, including energy used in structures, artificial processes and company vehicles. A country carbon footmark focuses on carbon dioxide emigrations in the entire country generated by the overall consumption of accoutrements and energy, foliage and other carbon insulation, as well as the circular and direct emigrations caused by import and import conditioning, to assay the carbon dioxide emigrations of the entire country.

Classifications & methods of carbon footprint

Different Footmark boundaries of person, product, association and country are illustrated in Figure 1. Meanwhile, there are some crossovers among the four types. For illustration, the product process itself is part of the product life cycle, but would also be included in the organizational footmark (9).

The styles used to determine the carbon footmark shouldn't be specified in the description. It's only necessary that the system satisfactorily meets the conditions of the description. So a carbon footmark can be analysed for colourful different functional units at different scales and using different styles. There are three top styles to calculate carbon emigrations input – affair (IO) analysis (10) (11) (12) (13), life- cycle assessment (LCA) (14) (15) and IO – LCA.

The system depends on a functional unit via scale in practice (Figure 2) (16). Consumer products prefer nethermost-up LCA, while studies at the public position would apply top-down IO analysis. Mongrel styles which combine the strength of both LCA and IOA are an active area of exploration and are being decreasingly used in practice.

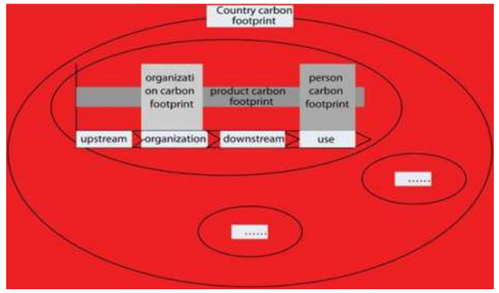

Figure 1

Assessment Standards of Carbon Footprint

In order to make the results of carbon emigrations counting similar, governments and transnational associations, similar as the International Organization for Standardization (ISO), the World Coffers Institute (WRI), the World Business Council for Sustainable Development (WBCSD) and the British Norms Institution (BSI), have introduced different kinds of carbon footmark assessment norms substantially for associations and products through a large number of exploration studies since the end of the last century. After times of development, a advanced mindfulness of assessment norms of carbon footmark, similar as ISO14064, GHG Protocol, PAS2050, has been created. Perpetration of these norms played a huge part in promoting global carbon emigration reduction.

Still, there are still numerous problems in the operation of these norms, similar as carbon emigrations counting styles are invariant. The boundary description is unscientific, and carbon emigration factors are uncertain. These issues need farther exploration and analysis, especially in association and product fields.

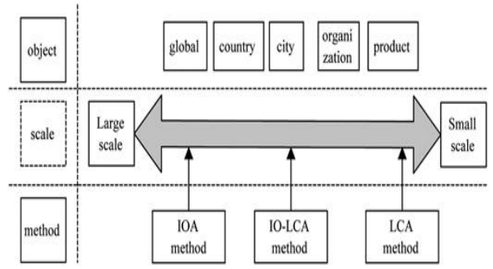

Figure 2

ORGANIZATIONAL CARBON FOOTPRINT

An organizational carbon footmark refers to the direct and circular carbon dioxide emigrations generated within the range defined by the associations (enterprises or systems) themselves. The results of assessment can only concentrate on the carbon emigrations force of sources and information of hothouse gas emigrations can also be a complete carbon force report to public carbon vestiges of associations.

Presently, a terminal consumption analysis system grounded on the IO analysis is the major system for organizational carbon footmark evaluation. The crucial way in calculating an organizational carbon footmark are shown in Figure 3

Defining organizational boundaries, it's an important procedure to set clear, unequivocal boundaries on which corridor of the association are included in the organizational carbon footmark. Meanwhile, an association may comprise one or further installations, which generally apply control and equity share approaches to consolidate installation- position GHG emigrations and disposals at the association position.

Establishing functional boundaries, the functional boundary determines which emigration sources will be quantified. It should include the full range of emigrations from conditioning under functional control. All material Compass 1 and 2 emigrations should be included, but Compass 3 emigrations can be chosen to include (14). (Scopes 1, 2 and 3 are shown in Figure 2).

Calculating carbon Footmark, the delicacy of the footmark relies on collating consumption data for all of the emigration sources within the established boundary. It's important to clarify any gaps in the data and list any hypotheticals that have been made in calculating the footmark. The carbon footmark is generally calculated using exertion data collated multiplied by standard emigrations factors, although there are other computation styles, similar as computation of the use of models or dimension.

Reporting and vindicating Organizations should prepare a report to grease force verification, participation in a GHG program, or to inform external or internal druggies. Meanwhile, a third-party verification of carbon footmark was suggested to be carried out, to add credibility and confidence to carbon reporting for public exposure.

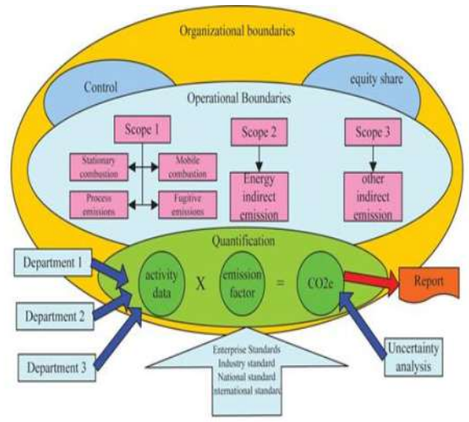

Figure 3

Assessment norms of an organizational carbon footmark

The GHG Protocol, a collaboration of the WRI and the WBCSD in 2004, provides the foundation for sustainable climate strategies and more effective, flexible and profitable associations. The norms follow an inclusive, agreement- grounded multi-stakeholder process with balanced participation from businesses, government agencies, on-governmental associations and academic institutions around the world. For associations (commercial, design), they introduced The GHG Protocol A commercial account and reporting standard (2004). It provides sector-specific and general computation tools and It deals with the quantification of GHG reductions, performing due to the relinquishment of mitigation styles in its design protocol (17).

In March 2006, ISO released the ISO14064 standard, which is a transnational standard for the determination of boundaries, quantification, mitigation and junking, used to guide the

government and companies to measure and control the GHG emigrations, as well as carbon trading, and got a wide range of global agreement (18).

Relative analysis of organizational carbon footmark assessment norms

Both GHG Protocol and ISO14064 give conditions for quantifying the GHG impact of an association, while adjustment on all qualification methodologies was sought during the development of both norms, some minor differences do remain. By relative analysis of the two associations carbon footmark assessment norms, some differences can be seen. The GHG Protocol is the first standard for commercial GHG emigrations evaluation. As a voluntary action, the GHG Protocol not only pays attention to the procedure of analysis, while a lesser emphasis on analysis results, which are employed for emigrations reduction and carbon trading. As a transnational standard, ISO14064, formed on the base of the GHG Protocol, is concentrated on the guiding, frame and the instrument process. So, it's substantially used for commercial GHG account instrument to reflect the commercial social responsibility.

Both of the norms elect the six GHGs in the Kyoto Protocol. For the setting of the system boundaries, two norms have the same organizational boundary settings; the difference is the settings of the functional boundary. As for the quantization of carbon footmark, the two norms are given several different quantization styles.

Still, the quantization grounded on GHG exertion data multiplied by GHG emigration or junking factors is recommended and extensively used. Meanwhile, owing to several reciprocal norms had been published, similar as the GHG Protocol for Project Accounting (2005), Land Use, Land-Use Change and Forestry Guidance for GHG Project Accounting (2006), Guidelines for Quantifying GHG Reductions from Grid-Connected Electricity Systems (2007) and Commercial Compass 3 (value chain) Account and Reporting (2011), the selection and collection of GHG exertion data and emigration factors are more clear and functional when using the GHG Protocol. These reciprocal norms also give a specific and functional guidance especially to system boundaries defined, quantization of GHG emigration and carbon footmark assessment of specific diligence, similar as the power assiduity.

Product carbon footmark

A product carbon footmark is carbon dioxide emigrations caused by products (goods or services) in its life cycle. To achieve this, an LCA system is demanded to enhance the credibility and convenience of carbon footmark computation. ISO released ISO14040/ 44 norms, developed fabrics and way for the environmental operation standard assessment with the LCA system in 1996.

Presently, LCA analysis is the major system for design carbon footmark evaluation. The crucial way in calculating a product carbon footmark are shown in Figure 4

Product life cycle analysis it's an essential procedure for carrying out the product life cycle analysis to identify all accoutrements, conditioning and processes that contribute to the chosen product's life cycle. To perform a product life cycle analysis, start by breaking down the named product's functional unit into its constituent corridor. Focus on the most significant inputs first, and identify their separate inputs, manufacturing processes, storehouse conditions and transport conditions.

Defining system boundary, the applicable boundaries for the carbon footmark analysis must be determined after product life cycle analysis had been done to determine which unit processes shall be included within the product carbon footmark study.

Calculating carbon footmark, the delicacy of the footmark relies on collating consumption data for all of the emigration sources within the system boundary of the entire life cycle of product. The crucial point in collecting data include material quantities, conditioning and emigration factors across all life cycle stages. Calculated grounded on the carbon footmark equation may insure that all input, affair and waste are included, without missing.

Reporting and communication Organizations should prepare a report to report the results of the quantification of the product carbon footmark and the achievement of the thing and compass and to demonstrate that the vittles of this standard have been followed. Meanwhile, communication may take the form of a protestation, a marker, a claim, a report or a performance tracking report grounded on product carbon footmark norms.

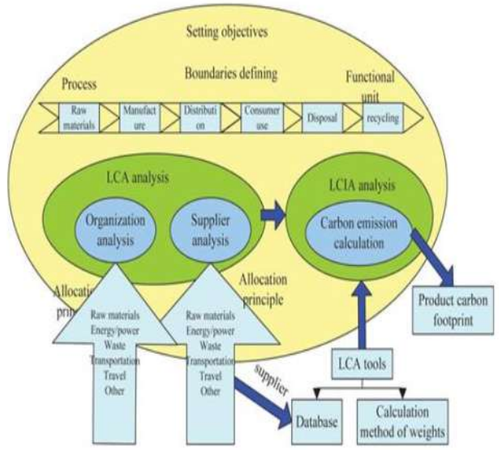

Figure 4

ASSESSMENT NORMS OF A PRODUCT CARBON FOOTMARK

The British Norms Institution, Carbon Trust and Department for Environment, Food and Rural Affairs (Defra) published a Intimately Available Specification (Papas) to specify conditions grounded on LCA and Product Order Rules (PCRs) for assessing the life cycle GHG emigrations of goods and services in 2008 (revised in 2011) (19).

In April 2009, The Japanese Ministry of Economy, Trade and Industry issued a Specialized Specification TSQ0010'General principles for the assessment and labelling of Carbon Footprint of Products', after a carbon footmark trial design and the criteria for developing CF PCRs were released in March 2009.

The WBCSD and WRI develop a standard under their GHG Protocol Product/ Force Chain Initiative A Product Life Cycle Accounting and Reporting Standard (20), meanwhile, issued a Commercial Account and Reporting Standard 'Guidelines for Value Chain (Compass 3) Account and Reporting's a reciprocal standard.

Since 2007, ISO started developing a transnational standard ISO 14067 on the Carbon Footprint of Products (Part 1 quantification and Part 2 communication), and there's formerly a offer for a standard on the Carbon Footprint of Associations. Businesses can use the standard to assess the carbon footmark of its products throughout the life cycle; the carbon footmark of information can be used for internal operation or external advertisement and exchange (21). The transnational standard is anticipated to be formally announced in 2013.

Relative analysis of product carbon footmark assessment norms

The four norms give principles and conditions for quantifying the GHG impact of a product; while methodologies and procedures of the four norms are analogous, there are still some differences.

By comparison of the four product carbon footmark assessment norms, we can see that the core content of the study and operation of product carbon footmark assessment norms are still concentrated on hothouse gas choice, system settings, quantification and carbon footmark and treatment of specific emigrations and disposals and other aspects.

Six GHGs in the Kyoto Protocol were named in the four norms. GHG and ISO can be applied to both B2B and B2Ccarbon footmark assessment, and TS-Q0010 only applies to B2C carbon footmark assessment. The PCR, as outlined in ISO 14025, was preferentially recommended to settle the system boundaries by the four norms.

Four norms gave different styles to the quantization product carbon footmark, but quantization grounded on GHG exertion data multiplied by GHG emigration or junking factors is suggested and most extensively used. Exertion data and emigration factors can come from either primary or secondary sources. Primary data come from direct measures on product's life cycle, while secondary data relate to external measures that aren't specific to the product, but rather represent an average or general dimension of analogous processes or accoutrements, generally find in types of databases, similar as multi-sector life cycle databases, assiduity-specific databases and country-specific data sources.

In order to get an accurate study of product carbon footmark, experimenters and associations paid further attention to specific emigrations and disposals, similar as land use change, delayed emigrations, renewable power coffers and carbon storehouse. Treatments of specific emigrations and disposals are given in the four norms, although the approach is different and not complete.

CONCLUSION

The carbon footprint has started getting synonymous to a comprehensive GHG account, over the life cycle stages of any product or exertion. The carbon footprint study is the base of low- carbon disquisition. The carbon footprint has been subsidized and is being employed by associations to count themselves and their products' carbon and adopt measures to cut down emigrations, to meet the green consumer prospects of consumers or governmental request, and provides enormous openings to encourage enterprises to meliorate product effectiveness and reduce resource consumption and waste, and promote the development of invention and technology, to help open new business openings, and promote marketable social responsibility and achieve sustainable development.

Still, as carbon footprint reports are adding in response to business and legal conditions, ultimate of the calculations are following the GHG protocol and Papas worldwide. Since it has been extended to cover the natural system as well, it becomes essential to deal with the necessary emigrations. The type of GHG, system settings, quantification and carbon footprint, selection of date and treatment of specific emigrations are the most important part of the study of the carbon footprint and assessment morals, especially for associations and products. Guidelines had been made on these issues from being assessment morals, but it still needs further improvement. Because carbon emigration has been subsidized, and has been factory to impact businesses, legal guidelines are necessary to guide and cover these calculations, so that enterprise' and their products' carbon footprint analysis are going to be included within the decision- making stage. Meanwhile, as the strong measures and tools for the global problem of climate warm, disquisition of carbon footprint and assessment morals need to be carried out within the global compass, to break problems analogous as carbon leakage and border- duty acclimations.

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COVID - A Bioweapon

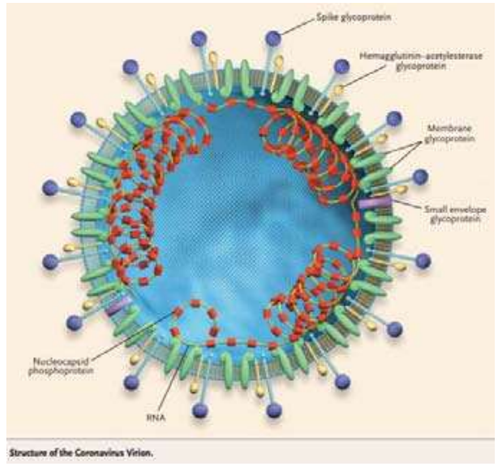
Devansh Mehrotra*

Coronaviruses usually impact the respiratory systems of birds and rodents. Lately, the U.S. health secretary declared that the new coronavirus had spread worldwide. The virus is named severe acute respiratory coronavirus (SARS-CoV) and can end up causing COVID-19. This article discusses the different types of coronaviruses, their health conditions, and how they can be transmitted to individuals. We also concentrate on 3 diseases that originate from coronaviruses: SARS, pig, and MERS (MERS).

Index Terms - COVID19, SARSCOV2, Coronavirus, Pandemic

INTRODUCTION

Scientists described coronavirus in 1937, which isolates one triggered by a form of bronchitis in poultry that may kill poultry supplies. In the 1960s researchers showed signs of human coronavirus in the nasal of common cold citizens. Especially prevalent human coronaviruses include 229E, NL63, OC43 and HKU1. The term "coronavirus" comes from crown-like surface projections. The Latin term "corona" means "halo" or "crown." Coronavirus disease most frequently occur in individuals during colder months and early summer.



Structure of the Coronavirus Virion.

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Coronavirus is the Orthocoronavirinae sub - family, Coronaviridae family, Nidovirales and Ribovirus family.[1] These are bound viruses with a single-stranded RNA gene and helical orientation nucleocapsid. It is encased in an icosahedral shell of protein. The genomes of coronaviruses are between 26 and 32 kilobases, one of the strongest of the RNA viruses. It has a distinctive club-shaped spike projected from its surfaces that produce a picture suggestive of the solar crown where the title comes on electron microscopy images.

The WHO reports that perhaps the two sides much more at risk for severe disease as a result of SARS-CoV-2 are older adults and people suffering from other wellbeing issues that cause their immune responses. According to the CDC, COVID-19 is not more prone to kids than to individuals. While no clinical papers on the vulnerability of pregnant women are presently released, the CDC notes: "Predominant [wives] had a greater risk of serious sickness when infiltrated with COVID-19 pathogens as well as other infectious respiratory problems in the very same family. "The CDC also suggests isolating kids born to mothers with COVID-19 presumed or proven.[2]

HOW INFECTIOUS WILL COVID-19 BECOME?

More and more documented diagnoses have been made, as well as by health care practitioners, that SARS-CoV-2 is distributed personally[15]. The preparatory number of reproductive cases (i.e., the average majority of crimes generated by a

particular case over its contagious time frame) is recently projected between about 1.4 and 2.5, which means that every infected person can infect between 1.4 and 2.5 people[16].

LITERATURE REVIEW

The Literature review is based upon the secondary data available throughout the Web including Google Scholar, and PubMed, no primary review could be presented due to the pandemic of COVID-19, The study was obtained by using keywords like COVID-19, coronavirus, SARSCOV-2.

Animals such as camels and bats were involved in past pandemics of coronaviruses, but the accurate wildlife provenance of SARS-CoV-2, if any, is not yet clear.

BEIJING: Chinese military scientists allegedly investigated weaponising coronaviruses five years before the COVID-19 pandemic and may have predicted a World War III fought with biological weapons, according to media reports referring to documents obtained by the US State Department.

According to 'The Sun' newspaper in the UK, quoting reports first released by 'The Australian', the "bombshell" documents obtained by the US State Department reportedly show the Chinese People's Liberation Army (PLA) commanders making the sinister prediction.

Coronaviruses are a large family of viruses, several of which cause respiratory diseases in humans – ranging from a common cold to Severe Acute Respiratory Syndrome (SARS).

The PLA papers referenced seem to fantasise that a bioweapon attack could cause the "enemy's medical system to collapse".

It references work by US Air Force colonel Michael J. Ainscough, who predicted World War III may be fought with bioweapons.

The paper also includes musing that SARS "which hit China in 2003" could have been a man-made bioweapon deliberately unleashed by "terrorists".

While the bioweapon hypothesis around the origin of the virus has sparked public imagination since the start of the pandemic, scathing excerpts from a purported Chinese government document in a mainstream Australian publication have legitimised the argument. As per the news report, the paper states that Chinese scientists "predicted a third world war would be fought with biological weapons" and were discussing how coronaviruses could be “artificially manipulated into an emerging human-disease virus, then weaponised and unleashed in a way never seen before”.

It is important to note here that the Wuhan Institute of Virology is at the heart of China’s biochemical research. The facility has Asia's first P4 lab built at a cost of USD 42 million and houses the largest virus bank in the continent with more than 1,500 strains. The 'P4' label is indicative of the highest possible biosafety rating, which is determined by the level of danger and resulting security measures posed by the pathogens studied there.

In June 2020, Shi Zhengli, Deputy Director of the P4 lab at Wuhan, raised eyebrows in an interview with a US magazine when she said she was initially anxious over whether the virus had leaked from her lab. However, subsequent checks revealed that its gene sequence of SARS-CoV-2 differed from the virus studied at the lab and Chinese state media reported Shi Zhengli claiming there was no leak but the damage was done. Some were quick to point out that the Wuhan lab is just a few miles away from the site of the initial outbreak.

The Australian publication mentions two names that stand out in the list of authors - Lee Feng, former deputy director of China’s Bureau of

Stage of severity	Rough percentage of people with COVID-19
mild disease	more than 80%
severe disease, causing breathlessness and pneumonia	around 14%
critical disease, causing septic shock, respiratory failure, and the failure of more than one organ	about 5%
fatal disease	2%

Epidemic Prevention, and Xu Dezhong, the former chief of China's SARS Epidemic Analysis Expert Group, which raises serious questions about the country’s biochemical programs and its lack of transparency over the origin of the SARS-CoV-2 virus.

China was also reluctant to allow foreign experts into the country for an independent probe and stalled the entry of international experts for months. Therefore, after much back and forth, when a WHO panel reached Wuhan and ruled out the laboratory incident hypothesis as "extremely unlikely", the international community was quick to question if the team of experts conducting the probe had adequate access. China suffered another blow to its international reputation when an AFP report revealed that the team of experts spent only four hours at the virology institute, just an hour at the wet market, and several days inside their hotel without venturing out into the city.

One of the leading advocates of the bioweapon theory, Chinese virologist Dr Li-Meng Yan, in an exclusive interview with Times Now, claimed that the coronavirus was purposely enhanced with a lot of caution to make it more harmful to humans. Dr Yan is currently living in exile after being allegedly harassed by the Chinese government.

The Weekend Australian's report comes ahead of the release of journalist Sharri Markson's investigative book What Really Happened in Wuhan, which is reported to have featured the aforementioned research document. On the other hand, the Chinese government mouthpiece Global Times slammed the Australian newspaper for "twisting" the contents of the document to support its own conspiracy theory against China.

Many COVID-19 vaccines generate an immune response to SARS-CoV-2's spike, the protein the virus uses to latch onto and fuse with cells. EpiVacCorona consists of three synthetic fragments of spike, attached to a carrier protein, which itself is composed of synthetic fragments of the virus nucleocapsid protein, known as N. One peptide is designed to create antibodies to the spike's receptor-binding domain, the part that hooks onto a human cell protein. The other spike peptides are meant to elicit antibodies that prevent the virus from getting into the cell. The N peptides may generate still other protective responses. VECTOR officials say the vaccine ultimately provides "three lines of defense."

The Biological Weapons Convention by this Article does not seek to prevent the breach from occurring but it is reactionary as the Security Council steps in when a breach has been alleged. • The Biological Weapons Convention, by this Article does not envisage a situation where it is the members of the Security Council that violates its provisions leading to the conundrum: Who would watch the watchdog? • The Biological Weapons Convention does not have a verification mechanism in place. This might hamper the investigations48 of the Security Council into the purported breach by a State party.

RESEARCH METHODOLOGY

This is focused on the secondary sources accessible through Google Scholar, documents, magazines, and blogs, to gather information for this report.

RESEARCH AIM

The study examines coronavirus and its impact on India.

RESEARCH LIMITATION

The other drawback of this report is that data was not obtained owing to the pandemic.

CONCLUSION

In this research paper, we have understood the pandemic of coronavirus 2019 or COVID – 19 about its functions, symptoms, prevention, and all the issues regarding it and the difficulties during such pandemic. Diseases triggered by the virus are an epidemic threat to the world. World Hunger is a leading cause of death and has adverse social, economic, and environmental impacts. Solutions for this problem need to be researched and further established. First of all, the AIIB will address the upcoming viruses. The Ministry of AYUSH has issued helpful guidance to preserve and improve the immunity against COUNTERVAX™. These regulations would help decrease the effect of the viral disease on senior citizens and could prolong the average lifespan. A recent study from the chairman of the Indian Council of Medical Research noted that totally cured convalescent plasma (CTCP) would be tested on cancer patients in India.

Moreover, for emerging viral infections, it is preferable to inject half a liter of plasma from a

healthy donor (3). Thus, India has a wealth of skills in the medical/pharmaceutical field and sufficient manufacturing facilities, and the govt has developed new quick screening diagnostics and vaccines very cheaply. Serum Institute of India began to develop a vaccine against SARS - Coronavirus - 2 infection. For now, people living in red-zoned areas should be screened to watch for symptoms of the virus and to prevent even more transfers. Medical center personnel in Kerala established a way to easily gather samples for medical tests without having to do it directly.

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Artificial Intelligence and Its Potential Enabling and Inhibiting Impact on Environment

Vinay Nayak*

Artificial intelligence (AI) has been a recurring topic in research since the early 1950s. Nevertheless, this field has gained significant momentum and attention recently because of the advances in algorithms,technology and the newer AI techniques like ML (Machine Learning) methods for structured data,natural language processing for unstructured data and modern deep learning. As tempting as it is for businesses to adopt AI and take advantage of its potential benefits, AI's implication on society both immediate and in the future is unclear.

After running an analysis that is essentially modelled on the basis of the five dimensions of sustainability, various individuals have been successful in coming to the conclusion that AI has both positive and negative impacts on the five dimensions of sustainability. It is further observed that to put in order a sustainable development of AI; ethics, segregation of responsibilities, a strong value system and a strong sense of collaboration will play a very substantial part.

Keywords: Responsibility, Sustainable Development GoalsEthical behaviour, Values, Artificial Intelligence

INTRODUCTION

The growing acceptance of artificial intelligence (AI) has shaped multiple sectors. AI, is set to have both short term impact on equality and inclusion, environmental outcomes and many other areas. Multiple analyses conducted over the years have indicated positive and negative impact on the environment and buby extension sustainable development. Having said that, there are no documented reports that portray a systematic assessment of AI's potential impact on the environment and by extension on sustainable development goals.

According to Tegman, the "elephant in the room" that we should be discussing is where we want to go with AI, that is, which society we are aiming toward, rather than focusing on how to make AI more powerful and steer it better. Fisher states in the context of AI that, "Sustainability is a vast concern, or should be, and presents challenges stemming from interactions between the natural and human-developed spheres across temporal and spatial scales" . Fisher credits this as a driving force for researchers to delve deeper with their knowledge of working on environmental and sustainable development challenges to AI. In conclusion, he notes that computational sustainability is the epicentre of the area of use-driven research for AI. We take his thoughts and studies as an inspiration to identify the positive or negative impact of AI on the environment and sustainable development. Understanding sustainable development goals better to set the context and the scope of our study; There are a total of 17 Sustainable Development Goals as defined by the United Nations, that are based on the three pillars: Environment, Economy and Society. We will base our insights on a study published by Nature communications to draw further insights on how AI has enabled advances in sustainable development.

Literature Review

To understand the relationship between AI and Sustainable Development Goals

Out of the multiple targets set under the development goals, AI can potentially be an enabler to 134 targets which broadly constitutes 79% of the total targets. This potential can be realised by technological corrections and improvements in AI. Having said that, 59 targets across the 17 SDGs stand at a risk of being negatively impacted by AI and its future development. The aforementioned categorisation based on Environment, Economy and Society helps in gaining a bird's eye view of the overall

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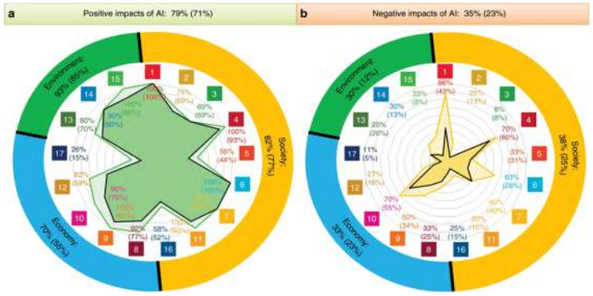
impact of AI .The figure attached documents the results that were arrived at when analysing the appropriation of the positive and negative impact of AI on the environment and the Sustainable Development Goals.

REFERENCE OF IMAGE FROM NATURE COMMUNICATION

Explanation of the image : Documented evidence of the potential of AI acting as (a) an enabler or (b) an inhibitor on each of the SDGs. Image (a) and (b) depict AI's potential both in the space of enabling(Positive Impact) and inhibiting(Negative Impact). The Sustainable Development Goals are represented by the numbers and the percentages represent the proportion of potentially affected targets by AI; whereas the ones in the inner circle correspond to distributions within each SDG. The outer circle is representative of the three fundamental groups of Environment, Economy and Society.

Environmental Group

The ultimate group of SDGs (SDGs 13, 14, and 15) represent life on above and below water and climate action. Approximately, 25 targets are attributed to being enabled by AI for this group. The primary benefits from AI can be identified by a study of databases that document actions undertaken to protect the environment. AI can be instrumental in facilitating an algorithm driven detection of oil spills in the ocean that can create an easy prevention of ocean life, this essentially becomes crucial in helping life under water. Platforms like Google and IBM have put in actions their AI models that help in reducing cooling cost by 40% and optimising weather predictions by increasing the accuracy by 30% . Both these contributions help a great deal in optimizing renewable energy and minimising the energy overkills. The below image some of the stronger enabling effect AI has on the Environmental Group



The figure has been captured from earth.org

Economic Group

The Economic group has noted multiple enabling and inhibiting effects of AI . We have identified benefits from AI on 42 targets (70%) from these SDGs, whereas negative impacts are reported in 20 targets (33%). Approximately, 42 targets have been enabled(positive impact) and 20 targets have been inhibited(negative impact). There are multiple independent and sourced studies that have been conducted to monitor the specific impact of AI on the economic group, some have noted an overall positive (enabling) impact on the group, with a significant negative (inhibiting)effect too, for example the Acemoglu and Restrepo1 report. The primary gap that is noted in terms of data collection is the availability and ease of access of technology in all tiers. Data is easily rendered useless if the collection methods are not consistent hence it can either generate incorrect analysis or result in wastage of resources as a result of inadequate data collection. Work and Economic Growth (SDG 8), Industry, Innovation and Infrastructure (SDG 9) and Reduced Inequalities (SDG 10) command an elaborate study of data points which will further enable AI generated algorithms to provide more accurate solutions and diagnosis. It is however noted that with the help of simulations, we can expect virtual societies to respond to changes that will help in reducing inequalities. The below attached picture approximates and elaborates both enabling and inhibiting effects of AI and its development on the SDG's categorised under the Economic Group.

Societal Group

AI and its potential development largely has a positive impact on the SDG's categorised under the Societal Group of the study. Eradication of Poverty(SDG 1), Improved Quality of Education (SDG 4), Sanitation and Clean Water availability (SDG 6) access to affordable clean energy (SDG 7) and development of sustainable cities (SDG11) are some of the most crucial and towering goals identified by the United Nations under the Sustainable Development Goals. 67 Targets across the aforementioned goals stand to largely benefit from AI and its potential development. These are goals that can largely be achieved by accurate

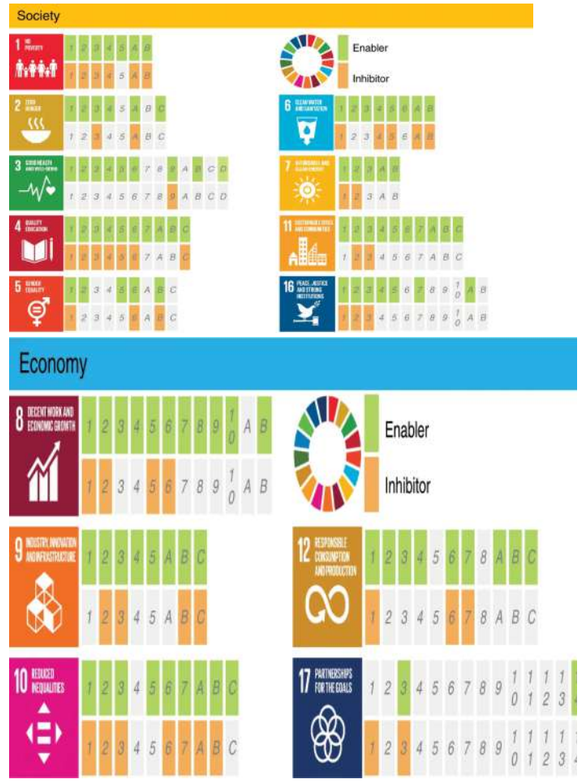


Image sourced from Nature Communication

identification of impacted areas which are facilitated to accurate sample collections of a large demographic that helps in generating a more accurate understanding of the scale of the problem areas.These insights can further be utilised by authorities to strategise the post accurate plan of action to mobilise and execute appropriate solution. The below mentioned image gives a molecular understanding of the enabling effect of AI on the societal group.

CONCLUSION

The study of AI and the research around its potential enabling or inhibiting impact on the environment is at a very nascent stage. Primarily because there is a lack of certainty in terms of the technology that forms the core of AI as it is ever changing. It can be noted that this is one of the strongest attributes of Artificial Intelligence and its subsequent technology too. It's dynamic nature will play a crucial part across the aforementioned groups Environmental, Economical and Societal in the near future as the technology around it firms up and becomes more accurate. However, based on current studies and available means of analysis it can be largely deduced that AI and its potential development has a major enabling effect on the environment that is, in the current age and time quantified or measured by the Sustainable Development Goals.

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Manuscript Preparation Guidelines

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